

Journal of Endodontics, 1998, Vol 24

January

O'Boskey Jr FJ, Panagakos FS. Cytokines stimulate matrix metalloproteinase production by human pulp cells during long-term culture. J Endodon 1998;24:7-10.

PURPOSE: To examine the effects of inflammatory cytokines on the synthesis and secretion of MMPs by primary human pulp cells in vitro during long-term culture.

M&M: Extracted third molars had pulp tissue removed, minced and outgrowths of cells cultured and trypsinized. Samples were collected on days 2, 4, 7, 9, 11, 14 and 16. MMP activities were assayed by using substrate zymography using SDS-polyacrylamide gel electrophoresis.

RESULTS: Cytokines stimulate the production of elevated levels of MMPs by human pulp cells in long-term cultures and play a role in pulpal inflammation.

C&C: During chronic stages of pulpal inflammation, increased levels of cytokines (ie. IL-1 β and TNF- α) have the potential to stimulate pulp cells to secrete matrix-degrading MMPs, which in turn can destroy the ECM present in the pulp chamber. These MMPs also have the potential to degrade newly synthesized predentin.

January 1998

Rodney M. Waite

Siqueira JF, Lopes HP, Uzeda M. Recontamination of coronally unsealed root canals medicated with camphorated paramonochlorophenol or calcium hydroxide pastes after saliva challenge. J Endodon 1998;24:11-4.

Purpose: To evaluate the length of time needed for bacteria from human saliva to penetrate and thoroughly recontaminate coronally unsealed root canals medicated with CPMC, calcium hydroxide, or a combination of both substances.

M&M: 55 maxillary incisors and canines with straight roots had the foramen prepared to a #25 file then apical preparation was done at working length to a #40 file with standard coronal flaring. After sterilization, the teeth were then divided into 3 experimental groups and control groups. Group 1- teeth were medicated with CPMC; group 2- teeth were medicated with calcium hydroxide/saline paste, and group 3- with calcium hydroxide/CPMC/glycerin paste. A saliva leakage study patterned after Torabinejad's was performed with the reservoir being filled with human saliva and BHI broth. This was replenished every 3 days. Turbidity in the BHI broth denoted complete recontamination.

Results: Group 1 showed recontamination in ave 6.9 days (range 2-13 days); group 2- ave 14.7 days (range 4-34 days); group 3- ave 16.5 days (range 4-34 days). There was no statistical difference between groups 2 and 3, in which the calcium hydroxide pastes were used.

C&C: These findings suggest that the filling ability of these pastes may be more relevant in preventing recontamination than the chemical effect. Calcium hydroxide

pastes also physically restrict the proliferation of residual bacteria and kill them by withholding substrate for bacterial growth.

January 1998

Michael J. Mauger

Estrela C, Pimenta FC, Ito IY, Bammann LL. In vitro determination of direct antimicrobial effect of calcium hydroxide. J Endodon 1998;24:15-7.

PURPOSE: To determine the time required for the antimicrobial effect of calcium hydroxide in direct contact.

M&M: Six bacterial strains were used: *M luteus*, *S aureus*, *F nucleatum*, *P aeruginosa*, *E coli*, *Strep*. Suspensions of each microorganism and mixtures were prepared. 171 #50 absorbent paper cones were immersed in the inoculate for 3 min, then placed on Petri dishes and covered with calcium hydroxide paste. At intervals of 0, 1, 2, 6, 12, 24, 48, 72 h and 7 d two cones were removed from contact with calcium hydroxide and incubated.

RESULTS: The calcium hydroxide was active on all microorganisms, either alone or in mixtures, after 72 h of exposure and sooner on some species.

C&C: Ca(OH)_2 works by inactivation of the cytoplasmic membrane enzymes of the bacteria.

January 1998

Rodney M. Waite

Beeson TJ, Hartwell GR, Thornton JD, Gunsolley. Comparison of debris extruded apically in straight canals: Conventional filing versus profile .04 taper series 29. J Endodon 1998;24:18-22.

Purpose: To measure quantitatively the amount of debris extruded apically in straight canals by comparing a conventional step-back filing technique with instrumentation performed using the ProFile .04 Taper Series 29 system, to determine the frequency of apical plug development when canals were prepared short of the apical foramen, to quantify the amount of irrigant forced apically, and to determine the time required to prepare the canals with each technique.

M&M: 69 single rooted teeth with mature apices were selected and the area of the minor foramen was measured. The teeth randomly divided into 4 groups. Two groups were instrumented with K-files 1mm short (Group 1) and to the apical foramen (Group 3). The other two groups were prepared with ProFile 1mm short (Group 2) and to the apical foramen (Group 4). All teeth were prepared to a size #45 master apical file. After each instrument was used, 1 ml of distilled water was used to irrigate the canal using a safe-tipped notched needle and syringe. Debris was collected, dried and weighed to determine amount of extruded debris.

Results: Group 3 extruded significantly more debris than the other three groups. The ProFile used 1mm short of the apical foramen (Group 2) resulted in virtually no extruded debris, but this was not significantly different. Instrumentation time with the ProFile was significantly less than with the K-files.

C&C: Instrumenting 1 mm short of the apex allows a dentin/debris plug to form which reduces extrusion. The rotation movement of the ProFile system also helps reduce the extrusion of debris past the apex.

January 1998

Michael J. Mauger

Svec TA, Wang MM. Precurving of nickel-titanium files affects transportation in simulated canals. J Endodon 1998;24:24-6.

PURPOSE: To determine if precurving of nickel-titanium files influences transportation in simulated canals of varying curvature.

M&M: 160 clear acrylic blocks, 80 with a gradual curve (GC) and 80 with an abrupt curve (AC) were instrumented with size 30 NiTi K-files, which were precurved to 15, 20, 25, 30, 35, 40, 45, and 0 degrees. Filing was done on a machine with an in-and-out motion for 300 strokes, ten blocks for each of 8 experimental groups. Pre- and post-op images were analyzed and transportation of the canal was measured at 1 mm from the apex (T1) and on a line bisecting the apex of the curve (TB).

RESULTS: Overall, for gradual curves, the 25 degree group produced significantly less transportation. For abrupt curves the 45 degree group produced significantly less transportation. Transportation for GC was significantly less than AC.

C&C: NiTi files can be precurved and transport less in gradual curves.

January 1998

Rodney M. Waite

Freeman MA, Nicholls JJ, Kydd WL, Harrington GW. Leakage associated with load fatigue-induced preliminary failure of full crowns placed over three different post and core systems. J Endodon 1998;24:26-32.

Purpose: To determine if the number of load cycles required to cause preliminary failure of full crown restorations having a standardized minimal ferrule height and subjected to cyclic loading of masticatory level forces is significantly different, depending on which of three different post and core systems is used; and evaluate leakage associated with these restorations after preliminary failure has occurred and an additional 100,000 load cycles had been applied.

M&M: 30 maxillary incisors had the crowns removed and prepared endodontically to a size #50 and step-back instrumentation. The canals were obturated with gutta-percha using lateral condensation after which it was removed with heated pluggers to provide an 8 mm post space. The teeth were divided into 3 groups depending on the type of post system used. Group 1 used Para-Post; group 2 used a #2 Flexi-Post; group 3 used a custom cast post and core. These were cemented with zinc phosphate cement and a composite core was placed. The teeth were prepared for full cast palladium silver alloy crowns with a 1 mm ferrule apical to the core material using a chamfer finish line. The crowns were cemented with zinc phosphate. A strain gauge was bonded to the lingual aspect of the teeth at the crown-tooth interface to monitor the micromovement between the crown margin and the tooth finish line. The teeth were cyclically loaded until preliminary failure at the margin. Then the crown were loaded another 100,000 cycles while immersed in .5% fuchsin dye. The teeth were section and leakage evaluated.

Results: There was no significant difference in the number of load cycles required to cause preliminary failure among the three post and core systems. Leakage occurred in all groups.

C&C: This study shows that there can be microleakage under the crown when a margin failure is not clinically detectable.

January 1998

Michael J. Mauger

Alhadainy HA, Abdalla AI. Artificial floor technique used for the repair of furcation perforations: a microleakage study. J Endodon 1998;24:33-5.

PURPOSE: To evaluate the effect of calcium sulfate or hydroxylapatite matrix on the sealing ability of a resin-modified, glass-ionomer material used to repair the dentin defect of furcation perforation.

M&M: Fifty-five molars were accessed and perforations made in the chamber floor using a #2 bur. Group 1 had the perforation repaired with Vitrebond in layers. Group 2 had calcium sulfate as a barrier under Vitrebond. After the calcium sulfate had set, a small cavity was made and the Vitrebond placed. Group 3 had defects repaired with hydroxylapatite under the Vitrebond. All chambers were then filled with composite resin. Group 4 had no filling material and Group 5 was the unprepared negative control. All teeth were painted with nail polish and submerged in 2% methylene blue dye and dye penetration was evaluated.

RESULTS: All experimental groups demonstrated dye penetration to varying degrees. The percentage of dye penetration in relation to the entire dentin-glass ionomer interface was calculated. Glass ionomer alone had a mean leakage of 22.79%, over calcium sulfate 17.49% and over hydroxylapatite 16.87%. There was a significant difference between group 1 and groups 2 and 3.

C&C: The glass ionomer alone tended to flow and extend along the root surface into the space occupied by interradicular bone. The calcium sulfate and hydroxylapatite provided successful barriers against the overextension of the Vitrebond.

January 1998

Rodney M. Waite

Cury VCF, Sette PS, Siva JV, Araujo VC, Gomez RS. Immunohistochemical study of apical periodontal cysts. J Endodon 1998;24:36-7.

Purpose: To compare the numbers of CD30+ cells in radicular cysts with atrophic, as opposed to, hyperplastic epithelium.

M&M: 30 biopsies of radicular cysts were separated into two groups according to appearance of the epithelium in the cyst. Atrophic cysts were those where the epithelium was only 2-10 cells thick. Hyperplastic cysts were those where the epithelium was irregularly hyperplastic. 11 cysts from each group were analyzed using a streptavidin amplified system to identify CD30 receptors in the cysts. It is thought that Th2 lymphocytes have a high expression of CD30 glycoproteins and that this may be a predictor of biological activity of radicular cysts.

Results: There were increased proportions of Th2 cells in cysts with hyperplastic epithelium.

C&C: This study suggests that a Th2-dominated immune response could be associated with radicular cyst active growth.

January 1997

Michael J. Mauger

Hansen MG. Relative efficiency of solvents used in endodontics. J Endodon 1998;24:38-40.

PURPOSE: To assess quantitatively the ability of various solvents to allow the passage of an endodontic file through different classes of endodontic sealers and the root filling material gutta-percha.

M&M: AH26, Proco-Sol and Sealapex sealers were syringed into 50 glass capillary tubes. Another 50 tubes were filled with thermoplasticized gutta-percha. All samples were allowed to set 1 w. The top 5 mm was filled with eucalyptol, eucalyptus oil, chloroform, orange oil, or xylene. A size 25 Hedstrom file was used with a push-pull and rotary action to attempt to penetrate the samples. The times taken for the Hedstrom file to penetrate the length of the tubes were recorded.

RESULTS: The time taken to dissolve the AH26 was considerably longer than any of the other solvent-sealant combinations tested. Proco-Sol became very brittle once set, which could have consequences with regard to subsequent restoration of a tooth disturbing the seal. Sealapex did not set unless it had contact with air. This may mean that the material may never set in the root canal. There was no significant difference between the dissolving ability of the solvents to remove Proco-Sol or gutta-percha.

C&C: The slowest time for solvent to dissolve or soften sufficient material to allow penetration of the file was <4 min.

January 1998

Rodney M. Waite

Mannocci F, Ferrari M. Apical seal of roots obturated with laterally condensed gutta-percha, epoxy resin cement, and dentin bonding agent. J Endodon 1998;24:41-4.

Purpose: To compare the sealing ability of a dentin bonding agent used with AH-26 in laterally condensed gutta-percha obturations.

M&M: 36 maxillary central incisors and mandibular premolars had the crowns removed and prepared to a MAF size of 45 in a step-back preparation. The teeth were then divided into 3 experimental groups. Group 1 teeth had the canals etched with 37% orthophosphoric acid for 1 min, then a dentin bonding agent (All bond 2) was placed. The canals were then obturated using AH- 26 and laterally condensed gutta-percha. Group 2 was similar to group 1 except that Scotchbond Multi Purpose Plus dental adhesive was used as the dentin bonding agent. Group 3 canals were not etched and received no bonding agent prior to the AH-26 and gutta-percha. The teeth were placed in methylene blue dye for 48h, then sectioned longitudinally to evaluate dye leakage. Some specimen were also prepared for SEM evaluation.

Results: Groups 1 and 2 had significantly less leakage than group 3. However, all specimen showed leakage. Group 1-2.55mm, Group 2- 2.45mm, and Group 3- 6.073mm.

C&C: The SEM showed that there was an intimate contact of the resin and dentin in all specimen observed, but not much of the adhesive penetrated into the dentinal tubules.

January 1998

Michael J. Mauger

Liu H, Lan W, Hsieh C. Prevalence and distribution of cervical dentin hypersensitivity in a population in Taipei, Taiwan. J Endodon 1998;24:45-7.

PURPOSE: To investigate the prevalence and distribution of dentin hypersensitivity and its possible causal factors among patients attending a hospital in Taiwan.

M&M: During 30 consecutive days all patients were examined for the presence of cervical dentin hypersensitivity. The patients were given a questionnaire and examination. All teeth were tested with a sharp probe and air-jet.

RESULTS: 780 patients were examined. Thirty-two percent reported having hypersensitive teeth at present and 12% reported a previous history of hypersensitivity. Premolars and molars were the most common teeth sensitive to air and probe stimuli.

C&C: Nuff said.

January 1998

Rodney M. Waite

Dunlap CA, Remeikis NA, BeGole EA, Rauschenberger CR. An in vivo evaluation of an electronic apex locator that uses the ratio method in vital and necrotic canals. J Endodon 1998;24:48-50.

Purpose: To compare the canal lengths determined by the apex locator in vivo to the actual apical constriction in both vital and necrotic canals.

M&M: 29 teeth with 35 canals had the working lengths determined using the Root ZX apex locator. The canals were classified as either containing vital or necrotic tissue. The canals were broached and rinsed with NaOCl. Excess irrigant was removed but the canals were not dried. When the working length was determined, the file was cemented into place with Ketac-fil. The teeth were extracted and the apical constriction was located by cutting a 4mm window down the long axis of the root apex. The file tip relation to the constriction was noted.

Results: There was no statistical difference between the ability of the Root ZX to determine the apical constriction in vital canals versus the necrotic canals. The measurements were within 0.25mm of the apical constriction in 52.9% of the canals; within 0.5mm in 82.3%; and within 0.75mm in 94.1% of the canals.

C&C: This seems to be a helpful adjunct to working length determination in most circumstances.

January 1998

Michael J. Mauger

Velez AE, Thomas DD, del Rio CE. An evaluation of sterilization of endodontic instruments in artificial sponges. J Endodon 1998;24:51-3.

PURPOSE: To investigate the sterilizability of endodontic instruments inserted into synthetic sponges.

M&M: 60 synthetic sponges were divided into 4 groups of 15 sponges each; positive control, negative control, dry heat, and steam autoclave. The groups were subdivided into 5 subgroups of 3 and submitted to 1 to 5 sterilization cycles. Three groups of 60 files were inoculated with spores and four files were inserted in each sponge. Four non-contaminated files were inserted in other sponges and served as a negative control. Instruments and the portion of sponge surrounding the instruments were placed in a trypticase soy broth and evaluated for spores.

RESULTS: All 12 positive controls were positive for bacterial growth, and all 12 negative controls were negative. All contaminated instruments in sponges placed in the steam autoclave were sterilized. Only 58/60 (96.7%) contaminated instruments inserted in the sponges and placed in dry heat were sterilized.

C&C: Instruments inserted and stored in synthetic sponges can be predictably sterilized when subjected to steam autoclave.

January 1998

Rodney M. Waite

Brown R, Hadley JN, Chambers DW. An evaluation of ektaspeed plus film versus ultraspeed film for endodontic working length determination. J Endodon 1998;24:54-6.

Purpose: To determine if there was a perceived difference by clinicians contrasting working length measurements made on Ultraspeed film versus Ektaspeed Plus film.

M&M: Cadaver specimen were used to make radiographs of maxillary and mandibular teeth with a #15 file in the canals using both Ultraspeed and Ektaspeed Plus film. 13 pairs of films were made. The films were coded and then viewed by six endodontist. Measurements were made from the file tip to the radiographic apex to the nearest half millimeter using a transparent ruler.

Results: Standard error was 1.906mm. This variance was attributed to differences among viewers 94%, 5% from a combination of viewer and tooth, and 1% from the two types of films.

C&C: Ektaspeed plus is suitable for use in working length determination and uses 50% of the radiation exposure.

January 1997

Michael J. Mauger

Yanikoglu F, Kartal N. Endodontic treatment of a fused maxillary lateral incisor. J Endodon 1998;24:57-9.

PURPOSE: A case report of endodontic treatment of a maxillary lateral incisor thaaf fused with a supernumerary tooth is presented.

Case Report: A 15 yo had a maxillary right lateral incisor fused with a supernumerary tooth. To gain an adequate space for the maxillary central incisor, the mesiodistal size of the fused maxillary lateral incisor had to be decreased. An access cavity was prepared on both the fused maxillary lateral incisor and supernumerary tooth and RCT completed as two separate canals.

C&C: A tooth with two separate root canals and with either one or two roots is the result of fusion. An enlarge tooth with a bifid crown and partially divided pulp chamber is the result of gemination.

January 1998

Rodney M. Waite

February

Anic I, Segovic S, Katanec D, Prskalo K, Najzar-Fleger D. Scanning electron microscopic study of dentin lased with argon, CO₂, and Nd:YAG laser. J Endodon 1998;24:77-81.

Purpose: To evaluate the morphological changes of the dentin surface relative to the angle between the fiber and dentin surface during lasing with the argon, CO₂, and Nd:YAG lasers.

M&M: 1.5mm thick slices were obtained from freshly extracted third molars. The slices had the smear layer removed and were divided into four quadrants to be lased in a perpendicular direction with each laser and a control. 5 single rooted anterior teeth were endodontically cleaned and shaped. Each was lased in a parallel manner from the apical stop to the coronal. The specimen were prepared and evaluated by SEM.

Results: The perpendicular lasing in all cases caused cratering. In some craters, a glass like substance was formed and in others a burnt carbon residue was left. The parallel lasing caused less damage to the dentin, but left grooves.

C&C: When using a laser on dentin, less energy is needed if it is used in a perpendicular fashion. The results were totally variable with each laser and therefore unpredictable for clinical use.

February 1998

Michael J. Mauger

Kolokouris I, Economides N, Beltes P, Vlemmas I. In vivo comparison of the biocompatibility of two root canal sealers implanted into the subcutaneous connective tissue of rats. J Endodon 1998;24:82-5.

PURPOSE: The long-term study of comparative biocompatibility between Apexit and a well-known sealer, Pulp Canal Sealer.

M&M: Forty-four rats, divided into 4 groups of 5 animals each for Apexit and Pulp Canal Sealer, had incisions made in the dorsum and subcutaneous pockets prepared.

Teflon tubes containing freshly mixed sealers were then placed into the pockets and empty Teflon tubes were used as an inert control. The animals were killed after 5, 15, 60, and 120 d and the tubes removed with the surrounding tissue and sectioned, stained and examined.

RESULTS: A severe inflammatory reaction was noted with Apexit on the 5th day, which had diminished by the 15th day but with areas of necrosis. On the 60th and 120th days there was a very slight reaction. Moderate inflammation was noted on the 5th day with Pulp Canal Sealer. The intensity diminished by the 15th day and connective tissue was present on the 60th day. No inflammation in the control group.

C&C: Apexit caused greater extensions of necrosis than Pulp Canal Sealer at the first observation periods, probably due to its high initial pH. Pulp Canal Sealer remained more irritating than Apexit at the long-term observation periods because small amounts of eugenol are constantly released.

February 1998

Rodney M. Waite

Jiang Y, Russell TR, Schilder H, Graves DT. Endodontic pathogens stimulate monocyte chemoattractant protein-1 and interleukin-8 in mononuclear cells. *J Endodon* 1998;24:86-90.

Purpose: To determine how much endodontic pathogens stimulate mononuclear cells to produce chemokines.

M&M: *Streptococcus* mutants, *Porphyromonas endodontalis*, and *Peptostreptococcus anaerobius* cultured in specific amounts and combined with peripheral blood mononuclear cells obtained from human volunteers. The amount of MCP-1 and IL-8 released by the monocytes in response to the pathogen was quantitated using an ELISA assay.

Results: *P. endodontalis* was the least efficacious at low ratios of bacteria to mononuclear cells. Each of the bacteria induced a dose-dependent increase in IL-8 and MCP-1.

C&C: Disease progression resulting from microbial infection depends on the immunopathogenic properties of the pathogen, size of the inoculation, and the host responses to the pathogen.

February 1998

Michael J. Mauger

Osorio R, Hefti A, Vertucci F, Shawley A. Cytotoxicity of endodontic materials. *J Endodon* 1998;24:91-6.

PURPOSE: To evaluate and compare the cytotoxicity of a selection of root-end filling materials, including amalgam, Gallium GF2, Ketac silver, MTA, Super-EBA, and All-Bond-2, as well as CRCS, AH26 and Endomet.

M&M: L-929 mouse fibroblasts and human gingival fibroblasts were grown. Insert cultures were used to test components of the All-Bond-2. One drop of each component of the All-Bond-2 was cured and the materials were also mixed. Extraction medium was added to each of the sample materials. Cytotoxicity testing was done

using an MTT assay, which measures mitochondrial enzyme activity, and crystal violet assay, which measures cell numbers.

RESULTS: CRCS was the least cytotoxic sealer, followed by Endomet and AH26. MTA was not cytotoxic. Gallium GF2 displayed little cytotoxicity, and Ketac Silver, Super-EBA, and amalgam showed higher levels of cytotoxicity. All-Bond-2 showed a high degree of cytotoxicity.

C&C: MTA is magic, as it was the only material not cytotoxic.

February 1998

Rodney M. Waite

Levy G, Koubi GF, Miserendino LJ. Cutting efficiency of a mid-infrared laser on human enamel. J Endodon 1998;24:97-101.

Purpose: To evaluate the efficiency of ablation of enamel exposed to Er:Cr:YSGG laser beam compared with a bur or a high-speed bur.

M&M: Crowns of 10 extracted third molars were separated and 20 grooves were cut in the occlusal enamel surfaces comprising 5 groups of 4 grooves each. Groups 1-4 were cut by a laser beam using varying powers of 2, 4, 6, and 8 W. In group 5, the grooves were made with a water-cooled high speed diamond bur. After the cuts, the samples were sectioned transversally to exposed the cross-sections of the cuts. Two cross-sections were done for each groove. The width and depth of each cross-section were measured using a binocular microscope. The ablation rate was also calculated. The specimen were examined using an SEM also.

Results: Cutting efficiency increased in a linear fashion as the power was increased. The laser had a cleaner cut surface as compared to the bur; but the bur cut the groove 3.7 times faster.

C&C: No melted debris was noted after the laser cuts. This would seem to indicate that none of the energy delivered was available to produce thermal damage.

February 1998

Michael J. Mauger

Hinrichs RE, Walker WA, Schindler WG. A comparison of amounts of apically extruded debris using handpiece-driven nickel-titanium instrument systems. J Endodon 1998;24:102-6.

PURPOSE: To compare the amount of apically extruded debris of three handpiece-driven rotary techniques: LightSpeed, Profile .04, and NT McXIM, with Flex-R using the balanced force technique.

M&M: One hundred single-rooted teeth were accessed and divided into four groups. All teeth were instrumented with one of the techniques and irrigated with a standardized amount of distilled water. All apical debris was collected in vials. Each sample vial with irrigant was weighed before desiccation to determine the amount of irrigant extruded through the apex and the weights of the debris determined.

RESULTS: The mean amounts of debris produced by the four instrumentation techniques showed no statistically significant differences.

C&C: WL, canal curvature, and major and minor foramen size did not play a significant role in the amount of debris that was extruded apically.

February 1998

Rodney M. Waite

Yaman SD, Alacam T, Yaman Y. Analysis of stress distribution in a maxillary central incisor subjected to various post and core applications. J Endodon 1998;24:107-11.

Purpose: To evaluate the stress distribution due to simulated biting forces and thus investigate the reliability of different post and core applications and to highlight the importance of using a unique stress value.

M&M: A three-dimensional finite element method (FEM) was used to determine the stress distribution in an endodontically treated and crowned maxillary central incisor using either a gold post-gold core, titanium post-amalgam core/composite core, and stainless-steel post-amalgam/composite core. Loading of 150, 170, and 200 N was supplied to the incisal edge at an angle of 26 degrees to the tooth axis. All of the posts were assumed to be applied to two-thirds of the root and the remaining 4-mm length of the pulp canal near the apex was assumed to be filled by gutta-percha.

Results: The cast gold post-gold core application yielded lower stress values than prefabricated post-composite or amalgam core applications.

C&C: It was a little difficult following the results section. They were mainly focusing on gold post-and core.

February 1998

Michael J. Mauger

Calas P, Rochd T, Druilhet P, Azais JM. In vitro adhesion of two strains of Prevotella nigrescens to the dentin of the root canal: the part played by different irrigation systems. J Endodon 1998;24:112-5.

PURPOSE: To try and establish whether removal of the smear layer could affect the attachment and colonization by a strict anaerobic bacterial strain with a high pathogenic potential such as Prevotella nigrescens, on bovine dentin.

M&M: 3 mm thick disks of bovine dentin were cut and smear layer created with a round bur. One section of tooth served as control and the other was washed with 6% citric acid solution for 5 min, then with 6.25% NaOCl for 10 min to remove the smear layer. Two strains of P. nigrescens were tested: a reference and a wild one. Samples were immersed in the tubes containing bacterial suspensions and incubated. Samples were prepared for examination using SEM.

RESULTS: The wild strains were markedly more active. There was no treatment effect for the referenced strain, but was significant for the wild strain. The number of bacteria adhering to the root canal surface after removal of smear layer was significant for the wild strain.

C&C: Another reason to remove smear layer.

February 1998

Rodney M. Waite

Shimauchi H, Takayama S, Imai-Tanaka T, Okada H. Balance of interleukin-1 beta and interleukin-1 receptor antagonist in human periapical lesions. J Endodon 1998;24:116-19.

Purpose: To quantify the levels of IL-1beta and IL-1ra in periapical exudates obtained from root canals, and investigate the relationship between the balance of IL-1beta and IL-1ra production and clinical symptoms of endodontically involved teeth.

M&M: Samples of periapical exudates were obtained from root canals of 29 teeth with or without radiolucent area around the periapex during the routine canal treatment. A radiographic exam was done within 1 week of sampling time, and the existence and size of a radiolucent area around the periapex was determined. Sizes of the radiolucent area on radiographs were categorized into three groups: the long axis being shorter than 1 cm, 1-1.5 cm, or longer than 1.5 cm. IL-1beta and IL-1ra concentrations were measured by ELISA assay.

Results: Levels of both were found in 25 of 29 samples. High levels of IL-1ra was found compared to IL-1beta and a significant positive correlation was found.

C&C: These results indicated a possible inhibitory mechanism of IL-1 activity mediated by IL-1ra occurred in periapical lesions. The balance between these two is important in controlling IL-1 activity, because the blocking of IL-1 activity by IL-1ra occurs in a competitive manner. This balance may be important in determining the resultant degree of local inflammation in periapical lesions. IL-1ra can prevent IL-1 induced bone resorption.

February 1998

Michael J. Mauger

Ounsi HF, Haddad G. In vitro evaluation of the reliability of the Endex electronic apex locator. J Endodon 1998;24:120-1.

PURPOSE: To compare precision and reliability of the Endex to that of tactile sense and radiography.

M&M: Thirty-seven extracted teeth were cut at the CEJ. Tactile measurement was completed using a #10 K-file. EM (Electronic Measurement) was done using the Endex EAL (Electronic Apex Locator). Finally, radiographic measurements were made. Real canal length was taken using a #15 K-file and direct observation.

RESULTS: Tactile measurement had a random distribution, whereas real, radiographic and EM have normal distributions. Radiography was more precise than EM, probably due to the use of an optimized radiographic technique that yields results far more precise than those attained clinically. The EM technique showed no significant interoperator or intraoperator variations.

C&C: These findings imply that each operator should correlate EM and radiographic measurements, but should rely primarily on EM rather than radiography (author's opinion).

February 1998

Rodney M. Waite

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February 1998

Rodney M. Waite

Svec TA, Wang MM. The effect of instrument precurving on transportation in simulated curved canals. J Endodon 1998;24:122-4.

Purpose: To determine whether or not precurving instruments to varying degrees will influence where and how much transportation will take place in simulated canals and to see if gradually or abruptly curved canal, of the same degree of curvature, will influence the position and amount of transportation.

M&M: 160 clear acrylic resin blocks with curved canals (30 degree curvature) equal to a size 30 file were instrumented with #30 files. The files were precurved to 15, 20, 25, 30, 35, 40, 45, and 0 degrees. The resin blocks had the curve starting at either 4mm from the apex (abrupt curve-AC) or 8mm from the apex (gradual curve-GC). The instrumentation was in a filing motion using a standard machine to deliver 300 in and out strokes per block. The degree of transportation at 1mm from the apex (T1) and at the middle of the curve (TB) was calculated.

Results: Transportation in the abruptly curving blocks was less than the gradual curving. The GC blocks had less transportation with the 20 and 40 degree precurved instruments. The AC blocks had less transportation with the 25 and 35 degree precurved instruments.

C&C: The method of how to determine how much to precurve in each clinical setting was not discussed. A filing motion will always cause transportation. The use of differing size instruments was not considered, but would change the results of the study.

February 1998

Michael J. Mauger

Thompson SA, Dummer PMH. Shaping ability of mity roto 360 and naviflex rotary nickel-titanium instruments in simulated root canals. Part 1. J Endodon 1998;24:128-34.

Purpose: To determine the ability of Mity Roto 360 degree and Naviflex rotary nickel-titanium instruments to shape simulated canals in resin blocks.

M&M: 80 canals with either abrupt curves or gentle curves were made of resin and instrumented with MityRoto 360 or Naviflex. The canals were instrumented in a stepdown manner with irrigation. The canals were accessed for preparation time, instrument failure, blockage, loss of WL, and canal form.

Results: The preparation times were the same at about 6 minutes. No instrument separated but several of each type were deformed. There were no canal blockages. Working distances were maintained generally throughout. The apical stops in both were of poor quality. Both produced smooth canals coronally, but MityRoto had more smooth canals apically. Both techniques produced a poorly tapered preparation.

C&C: Both techniques seem to be viable; however some alteration in technique is needed to increase the taper. The authors mentioned ProFile a lot in their discussion.

February 1998

Michael J. Mauger

Lopes MA, Filho FJS, Junior JJ, Almeida OP. Herpes Zoster infection as a differential diagnosis of acute pulpitis. J Endodon 1998;24:143-5.

Summary: A case report of an 81 yr old woman, who was seen for orofacial pain, which was originally thought to be an acute pulpitis; but was in reality an outbreak of herpes zoster along the Maxillary branch of the trigeminal nerve. The patient was treated with Zovirax; but still complained of sensitive skin in the affected area for 2 years.

February 1998

Michael J. Mauger

March

Takeichi O, Saito I, Hayashi M, Tsurumachi T, Saito T. Production of human—inducible nitric oxide synthase in radicular cysts. J Endodon 1998;24:157-60.

PURPOSE: To analyze iNOS (inducible nitric oxide synthase) production and the localization of iNOS-producing cells in radicular cysts.

M&M: NO modulates inflammation and is implicated in substantial tissue destruction. Fifteen patients diagnosed with radicular cysts based on clinical criteria (radiolucency 15 to 20 mm in size) were studied. Inflamed tissues of the PA lesions were removed at surgery and frozen. iNOS production was examined using immunohistochemical analysis.

RESULTS: Ten specimen were diagnosed as cysts and five as granulomas. Epithelial cells, endothelial cells and fibroblasts showed iNOS activity. PMNs and macrophages adjacent to blood vessels also exhibited positive expression of iNOS.

C&C: Epithelial and endothelial cells could be potent producers of NO in radicular cysts. Cells apart from the blood vessels showed weak or no iNOS synthesis. Inflamed cells in radicular cysts could synthesize iNOS in response to LPS and cytokines.

March 1998

Rodney M. Waite

Dalat DM, Onal B. Apical leakage of a new glass ionomer root canal sealer. J Endodon 1998;24:161-3.

Purpose: To compare the apical leakage of Ketac-Endo with a conventional epoxy resin-based sealer, AH26, in two different obturation techniques (single cone and lateral condensation) using a controlled vacuum technique.

M&M: 64 single rooted teeth were divided into 4 experimental groups after the crowns were removed and standardized root canal instrumentation was performed. Group 1 was obturated using Ketac-Endo with a single gutta-percha cone. Group 2 was also obturated with Ketac-Endo, but with laterally condensed GP. Group 3 was similar to group 1, except AH26 was used with the single cone. Group 4 had AH26 with laterally condensed GP. The teeth were then immersed in methylene blue and a vacuum for 7 days. The leakage was evaluated using a stereomicroscope after the teeth were longitudinally sectioned.

Results: All groups leaked with an average of 1.55 to 2.35 mm. Ketac-Endo groups showed some maximum leakage up to 6mm. The groups were not significantly different in their leakage.

C&C: This study does not tell me much. Another leakage study.

March 1998

Michael J. Mauger

Takahashi K, Lappin DF, MacDonald GD, Kinane DF. Relative distribution of plasma cells expressing immunoglobulin G subclass mRNA in human dental periapical lesions using in situ hybridization. J Endodon 1998;24:164-7.

PURPOSE: To investigate the distribution of plasma cells that express mRNA for each of the IgG subclasses in human dental periapical lesions.

M&M: B-cells and plasma cells are predominant in PA lesions and produce IgG, IgA and IgM. Multibacterial infections and their by-products somehow induce a local antibody response, but it is unclear how. In situ hybridization and immunological detection for IgG subclass were performed on tissues from 25 PA lesions (14 granulomas and 11 radicular cysts).

RESULTS: Plasma cells that expressed IgG1 were the dominant plasma cell type. There was no significant difference with regard to the relative abundance of each IgG subclass between the two types of lesions.

C&C: In situ hybridization technique shows precise localization of specific plasma cells. Plasma cells that express IgG1 are the predominant IgG-expressing cell in PA lesions and suggests that protein antigens are the major antigens both in dental pulp and PA lesions.

March 1998

Rodney M. Waite

Manthos A, Lyroutdia K, Economou L. Dense-cored vesicles in human dental macrophage-like pulpal cells. J Endodon 1998;24:168-70.

Purpose: To study macrophage-like pulp cells lying in the vicinity of nerve bundles and vessels from the central region of the human dental pulp that were characterized by fine projections in different directions and that contained several types of vesicles.

M&M: Pulpal sections were obtained from freshly extracted first premolars. The pulp was immediately fixed and sections obtained. The sections were 1 micron thick for light microscopy and 70 nanomicros thick for TEM evaluation.

Results: Macrophage-like cells seen contained two kinds of cytoplasmic vesicles. The smaller vesicle appeared empty; whereas the larger vesicles showed a heavily and homogeneously osmiophilic dense core. These cells exhibited dendritic-like processes.

C&C: It is not known what is in the vesicles or why it is significant. A piece of the puzzle type study.

March 1998

Michael J. Mauger

Panagakos FS. Transformation and preliminary characterization of primary human pulp cells. J Endodon 1998;24:171-5.

PURPOSE: To report the transformation and preliminary characterization of primary human pulp cells using an SV40-adenovirus construct.

M&M: Extracted impacted third molars were split, and the pulp tissue removed. Cultures of pulp cells were made and transfected with SV40, then named HPC-T.

RESULTS: The cells proliferated rapidly and retained many of the characteristics of the parent primary cells.

C&C: HPC-T cells seem to be a viable candidate in the process of establishing a clonal human pulp cell line for use in the study of dentinogenesis.

March 1998

Rodney M. Waite

Fischer EJ, Arens DE, Miller CH. Bacterial leakage of mineral trioxide aggregate as compared with zinc-free amalgam, intermediate restorative material and SuperEBA as a root-end filling material. J Endodon 1998;24:176-9.

Purpose: To determine bacterial leakage of MTA, compared with commonly used root-end filling materials.

M&M: 56 single rooted-teeth were instrumented with ProFile in a crown down manner. The root ends were resected perpendicular to the long axis of the teeth and the root-end was ultrasonically prepared to a depth of 3mm. The teeth were divided randomly into four groups with different root-end filling materials: IRM, SuperEBA, Alloy, and MTA. A #70 file was blunted and placed into the canals as to form a matrix in which the filling material could be condensed against, then removed after setting. The teeth were evaluated for bacterial leakage using *S. marcescens* in a model patterned after Torabinejad's. Leakage was noted when the Phenol red broth turned color.

Result: The alloy filled root ends leaked within 10 to 63 days. IRM leaked within 21 to 73 days. SuperEBA leaked within 24 to 91 days. The MTA did not leak until day 49. At the conclusion of the 120 day study, four of the samples had yet to show signs of bacterial penetration.

C&C: MTA wins again.

March 1998

Michael J. Mauger

Reddy SA, Hicks ML. Apical extrusion of debris using two hand and two rotary instrumentation techniques. J Endodon 1998;24:180-3.

PURPOSE: To investigate the quantity of apical debris produced in vitro using step-back instrumentation, balanced force technique, and two engine-driven rotary instrumentation techniques using NiTi instruments.

M & M: Sixty extracted pms were used and the degree of curvature determined. The crowns and pulp tissue were removed and canal patency established. Irrigation was with 2.5% NaOCl. Group 1 used K-files in a push-pull filing motion and the apical preparation enlarged to #55, followed by step-back. Group 2 used Flex-R files with the balanced force technique to a #55. Group 3 used a #55 Lightspeed file to WL and step-back to a #100. Group 4 used a #7 ProFile .04 to WL. Upon completion, the apically extruded debris was collected, dried, and weighed.

RESULTS: Group 1 produced significantly more extruded debris than any other method. There was no significant difference between groups 2, 3, and 4.

C & C: Rotary instrumentation proved to extrude less apical debris than filing motion. Groups 2, 3, and 4 all incorporate rotation during instrumentation, which tends to pull dentinal debris into the flutes of the file and direct it towards the coronal aspect of the canal.

March 1998

Rodney M. Waite

Nakata TT, Bae KS, Baumgartner JC. Perforation repair comparing mineral trioxide aggregate and amalgam using an anaerobic bacterial leakage model. J Endodon 1998;24:184-6.

Purpose: To compare the ability of MTA and amalgam for sealing furcal perforations in extracted human molars using an anaerobic bacterial leakage model.

M&M: 42 maxillary and mandibular molars had their apices and 5mm of the crowns removed. The apices were sealed with superglue and nail polish was applied to the root surface. A plaster matrix was made to simulate the bony socket. The chamber floor was perforated with a #330 bur and enlarged to a size #80 file. Group 1 teeth were repaired using MTA and group 2 teeth were repaired with amalgam. A dual chamber anaerobic bacterial model was used to test leakage with *F. nucleatum*. Controls were used.

Results: None of the MTA repaired teeth showed leakage after 45 days. 8 of 18 teeth repaired with alloy leaked by 45 days. The alloy leaked between 21 and 38 days.

C&C: MTA appears to have excellent sealing properties when used as a perforation repair material.

March 1998

Michael J. Mauger

Utsunomiya T. A histopathological study of the effects of low-power laser irradiation on wound healing of exposed dental pulp tissues in dogs, with special reference to lectins and collagens. J Endodon 1998;24:187-93.

PURPOSE: To investigate the effects over time of low-power laser irradiation on the wound healing of exposed pulp tissue in dogs. In addition, lectin binding patterns and the distribution of collagens type I, III, and V in the exposed pulp were analyzed.

M & M: Six dogs had all incisors and premolars examined and divided into two groups: laser irradiation and nonirradiation.. All teeth had class V cavities prepared and the pulp pin-point perforated. A gallium-alluminum-arsenide diode laser irradiated the exposed pulp tissue. The exposed pulp was covered by direct-pulp-capping with CaOH and the cavity filled with glass ionomer. The dogs were divided into 1, 3, and 7 w groups and killed. The teeth were embedded, sectioned, stained and examined. Sections were covered with seven kinds of lectins or antibovine type I, III, and V collagen antibodies.

RESULTS: The lectin binding patterns are different in each of the pulp cells and have a special role in the identification of these cells. Several of these were distributed in the fibrous matrix and dentin bridge and occurred earlier in the laser irradiated group. More degenerative changes were found in the non-lased group. Fibroblast proliferation and matrix formation was found earlier in the lased group.

C & C: Laser irradiation is a more effective treatment than the use of CaOH alone on the exposed pulp since it accelerated pulpal wound healing.

March 1998

Rodney M. Waite

Gorduysus MO, Etikan I, Gokoz A. Histopathological evaluation of the tissue reactions to Endo-Fill root canal sealant and filling material in rats. J Endodon 1998;24:194-6.

Purpose: To examine the histopathological and inflammatory tissue responses to Endo-Fill root canal sealant and filling material.

M&M: Polyethylene tubes (10mm long x 1.5 mm diameter) were filled with freshly mixed Endo-Fill and immediately implanted into the backs of 15 rats. Each rat had 4 tubes implanted. The rats were killed after 2, 7, 14, 28, and 56 days. The tubes were removed in bloc and section. The tissue was prepared for histopathological evaluation.

Results: At 2 days a moderate inflammatory response was seen. At 7 days, a slight inflammatory infiltration was noted. At 28 and 56 days, no inflammation was present. A thin fibrous wall was observed around the implant material at day 56 but not encapsulation .

C&C: Endo-Fill appears to be biocompatible in the backs of rats.

March 1998

Michael J. Mauger

Raiden G, Posleman I, Peralta G, Olguin A, Lagarrigue G. Dowel space preparation in root canals filled with glass ionomer cement. J Endodon 1998;24:197-8.

PURPOSE: To measure the time needed for partial removal and dowel space preparation with Peeso drills in canals filled with glass-ionomer cement and gutta-percha with different techniques and dentinal treatments, compared with those filled with Grossman's sealer and a lateral condensation technique.

M & M: Sixty-three extracted teeth were instrumented with K-files. Group 1 was irrigated with 25% tannic acid, and filled with a gutta percha cone and Ketac Endo. Group 2 filled with Ketac Endo and a single gutta-percha cone. Group 3 had a gutta-percha cone adapted with chloroform, canal irrigated with tannic acid, then filled with Ketac Endo. Group 4 was filled with Grossman's cement and laterally condensed gutta-percha. The teeth were stored for 72 h, then the canals were prepared for dowel space by means of Peeso drills #1 and 2.

RESULTS: Group 1 required longer post space preparation time than groups 2, 3 or 4. Group 4 required the least removal time.

C & C: The greater adhesion of glass-ionomer cement to dentin could generate greater difficulty for filling removal, whereas a greater volume of gutta-percha could diminish such difficulty.

March 1998

Rodney M. Waite

Myers J. Demonstration of a possible source of error with an electric pulp tester. J Endodon 1998;24:199-201.

Purpose: To determine whether electrical current can be transferred between adjacent teeth through contacting amalgam fillings.

M&M: Class II alloys were placed into 22 extracted premolars. The teeth were then mounted in pairs with the amalgams in contact using Snap acrylic resin. The teeth were dried and using a multifunctional electrical meter they were measured to see if current might flow through them. Three readings were made on each pair of teeth.

Results: It was shown that when an electrode was placed on one tooth, the adjacent tooth had current which past to it through the amalgam contact.

C&C: This suggests a potential source of error when using an electric pulp tester.

March 1998

Michael J. Mauger

April

Chutich MJ, Kaminski EJ, Miller DA, Lautenschlager EP. Risk assessment of the toxicity of solvents of gutta-percha used in endodontic retreatment. J Endodon 1998;24:213-6.

Purpose: To determine how much of a particular solvent used may become available to the tissues surrounding the tooth structure, and if the controlled use and the amount of such solvent of gutta-percha poses a significant health risk to the patient.

M&M: Fifty-five single canaled teeth were prepared 1mm short of the apical foramen up to a size #40 Flex-R file. Apical patency was maintained. The canals were all obturated with GP and Roth's sealer using lateral condensation. The teeth were secured in a receptacle so that any extruded solvent during retreatment was collected. The canals were retreated using either chloroform, halothane or xylene. Positive and negative controls were used. The extruded solvent was weighed using a Mettler balance.

Results: The mean weight of apically extruded solvent was 0.32 mg for the chloroform group, 0.35mg for the halothane group and 0.22 mg for the xylene group.

C&C: These amounts are minuscule and are several orders of magnitude below the permissible toxic dose. They do not pose a health risk to the patient.

April 1998

Michael J. Mauger

Blum J, Machtou P, Micallef J. Analysis of forces developed during obturations. Wedging effect: part 1. J Endodon 1998;24:217-222.

PURPOSE: To describe a modification in the Endographe's cupule that allowed study of the intracanal forces, which have been collectively labeled as the wedging effect using warm vertical condensation (WVC) and lateral condensation (LC).

M&M: The Endographe is composed of two transducers for the measurement of extracanal forces connected to data acquisition software. The wedging effect is created by two opposite forces applied simultaneously to the walls of the canal. A max incisor was endodontically prepared, then cut perpendicularly on its vertical axis at the CEJ. An impression of the main canal was made and cast in metal alloy. A single main canal was now composed of two independent parts. Three sensors, two measuring external forces and one for the wedging effect were used. Ten WVC were performed using the same four hand pluggers to the same lengths, then 10 teeth were identically prepared while in the cupule. Ten LC using size A, B, C and D spreaders were completed, then 10 teeth were identically prepared.

RESULTS: The mean values of the developed forces were not significantly different among the practitioners.

C&C: This preliminary study defined the notion of wedging effect and analyzed the chronology of force appearance.

April 1998

Rodney M. Waite

Blum J, Machtou P, Micallef J. Analysis of forces developed during obturations. Wedging effect: Part II. J Endodon 1998;24:223-8.

Purpose: To analyze four different techniques by measuring the forces applied by the practitioners involved in the study and the induced horizontal intracanal forces, or the wedging effect.

M&M: A newly developed Endographe was used to determine the force exerted in the root canal in a vertical and wedging direction. Different obturation techniques compared were 1) Warm vertical 2) Lateral condensation 3) Thermal mechanical and 4) Thermafil. A total of 20 canals of groups 1 and 2 were obturated and 10 canals of the other groups. Modifications of techniques using too large or small of a spreader were also evaluated.

Results: Thermafil had the least vertical forces in the canal and warm vertical the most. Warm vertical and thermal mechanical had the greatest horizontal forces. Lateral condensation gave the greatest wedging effect.

C&C: The results suggest that the most efficient technique is the lateral condensation.

April 1998

Michael J. Mauger

Jimenez-Rubio A, Segura JJ. The effect of the bleaching agent sodium perborate on macrophage adhesion in vitro: implications in external cervical root resorption. J Endodon 1998;24:229-32.

PURPOSE: To study the in vitro effect of sodium perborate on substrate adherence capacity of rat inflammatory macrophages.

M&M: Macrophages were elicited from rats. Dilutions of sodium perborate were 1:10, 1:100, or 1:1000. Adherence assays were performed and the number of non-adherent macrophages/ml was counted.

RESULTS: Sodium perborate inhibited substrate adherence capacity of macrophages in all conditions tested. The effect of sodium perborate was compared with that of NaOCl and eugenol and was found to be greater. Adhesion is the first step in the phagocytic process and sodium perborate could inhibit phagocytosis in macrophages and reduce inflammatory reactions in gingival and periodontal tissues.

C&C: The inhibitory effect of sodium perborate on macrophage adhesion could explain the infrequent cases of external cervical root resorption that occur when bleaching is performed only with sodium perborate.

April 1998

Rodney M. Waite

Bae KS, Baumgartner JC, Nakata TT. Development of an anerobic bacterial leakage model. J Endodon 1998;24:233-5.

Purpose: To develop an endodontic microleakage model using strict anaerobic bacteria in a two-chamber system.

M&M: 9 species of anaerobic bacteria were tested for length of viability, detection by turbidity of the broth, and detection by using a chromogenic indicator. Different culture media and pH chromogenic substrates were tested to reveal the best combinations for a microleakage model.

Results: *Fusobacterium nucleatum* and *F. necrophorum* were viable in all media tested and produced both turbidity and a color change after only 1 day of incubation. *Veillonella parvula* and *Peptostreptococcus anaerobius* were viable in some of the media tested.

C&C: Strict anaerobes can be used in a microleakage model.

April 1998

Michael J. Mauger

Huang T, Kao C. pH measurement of root canal sealers. J Endodon 1998;24:236-8.

PURPOSE: To compare the surface pH level of three different type sealers at various time intervals in vitro.

M&M: Canals (ZOE based cement), Pulp Canal Sealer (CaOH sealer) and AH 26 (resin sealer) were mixed and placed into three groups of 8 dishes, and incubated in 100% humidity at 37 C for 1 h, 24 h, 5 d, 8 d, 2 w, 3, w, 4 w, 5 w, and 7 w. The pH level was determined with a Twin pH meter.

RESULTS: The resin cement had an acidic pH (< 7). The ZOE sealer showed a similar pH level to the calcium hydroxide sealer at the end of the measurement, but initially started out as acidic.

C&C: An increase in pH level is good for bone repair. Calcium hydroxide and ZOE sealers have basic pH's.

April 1998

Rodney M. Waite

Sen BH, Buyukyilmaz T. The effect of 4% titanium tetrafluoride solution on root canal walls-a preliminary investigation. J Endodon 1998;24:239-243.

Purpose: To evaluate the effect of 4% titanium tetrafluoride-treated smear layer by SEM.

M&M: 6mm dentin segments were obtained from maxillary central incisors. 32 specimens were prepared as to create a smear layer using Gates-glidden burs. Another 12 specimen were smear layer free. These larger groups were then subdivided. Group 1A was the smear layer control. Group 1B was treated with TiF₄ only. Group 3 was treated with TiF₄ for 1 min then rinsed with NaOCl to see if the new smear layer can be altered. Group 4 was similar to 3 but EDTA, then NaOCl was used to remove the smear layer. TiF₄ was used on the smear layer free group alone in Group 2B. Each specimen was evaluated using SEM.

Results: TiF₄ modified the smear layer and produced a definite massive layer occluding the dentinal tubules. Intense spherical particles were observed to be bound to this dense layer. This new smear layer was not affected by either NaOCl or EDTA.

C&C: The authors state that this new smear layer may be useful in resisting bacterial reinfection of the tubules and help reduce microleakage due to disintegration of the smear layer.

April 1998

Michael J. Mauger

Ono K, Matsumoto K. Physical properties of CH61, a newly developed root canal sealer. J Endodon 1998;24:244-7.

PURPOSE: To evaluate the physical properties of a newly developed root canal sealer, CH61.

M&M: CH61 is developed by combining a liquid containing a fatty acid and glycol with calcium hydroxide, bismuth subcarbonate and rosin. Sealing ability was determined by penetration of rhodamine in a glass tube filled with the sealer. Flow, radioopacity, working time, and solubility were also determined. Canals, Sealapex, and AH26 properties were compared with CH61 properties.

RESULTS: CH61 had the least dye penetration, Canals the most. Flow rate was highest for Canals and AH26, while Sealapex had a low flow rate. AH26 had a higher radioopacity, while CH61 was between Canals and Sealapex. Working time was 63 min and solubility was lowest for CH61.

C&C: CH61 had excellent sealing properties and low solubility.

April 1998

Rodney M. Waite

Moritz A, Schoop U, Goharkhay K, Sperr W. The CO2 laser as an aid in direct pulp capping. J Endodon 1998;24:248-51.

Purpose: To study the effectiveness of laser pulp capping versus standardized techniques.

M&M: 200 patients with mechanical pulp exposures were treated with either conventional calcium hydroxide dressing sealed with glass ionomer cement or with a CO2 laser at 1 W and 0.1-s pulses with 1-s pulse intervals until the exposed pulps were completely sealed. Vitality was checked with thermal tests and with laser Doppler flowmetry and 1 week and monthly for 1 year.

Results: 89% of the lased teeth were vital after 1 year. 68% of the conventional treated teeth were vital after 1 year. There were no discrepancies with regard to pulpal blood flow and sensitivity.

C&C: Looks like a good use for lasers, if you happen to have one laying around.

April 1998

Michael J. Mauger

Matsushima K, Ohbayashi E, Takeuchi H, Hosoya S, Abiko Y, Yamazaki M. Stimulation of interleukin-6 production in human dental pulp cells by peptidoglycans from Lactobacillus casei. J Endodon 1998;24:252-5.

PURPOSE: To examine the effects of peptidoglycan (PG) on the production of IL-6 in cultured human dental pulp (HDP) cells, and to assess the mRNA expression levels of IL-6 in HDP cells in the presence or absence of various PGs by means of reverse transcriptase-polymerase chain reaction.

M&M: L. casei was cultured and PG extracted. HDP cells were obtained from third molars. PGs were added to HDP cells and the IL-6 content was measured. Total cellular mRNA was extracted from HDP cells.

RESULTS: When HDP cells were treated with PG the IL-6 levels were significantly increased compared with the non-treated cells. mRNA levels also increased, indicating an induction of expression of IL-6 mRNA by PGs.

C&C: In pulpal tissues where carious lesions or bacterial infection have occurred, the most commonly isolated microorganisms are gram pos bacteria. The PG is an essential cell wall structure of these bacteria and can induce IL-6 production. IL-6 may be associated with bone resorption, and its effects are time and dose- dependent.

April 1998

Rodney M. Waite

Katebzadeh N, Dalton BC, Trope M. Strengthening immature teeth during and after apexification. J Endodon 1998;24:256-9.

Purpose: To test, in vitro, the strengthening effect of this cervical strengthening technique.

M&M: 100 endodontically treated central incisors were divided into 5 groups. Group 1 served as the positive control and had no cervical preparation and the access restored with bonded composite. Group 2 served as the negative control and the cervical area of the canal was thinned out 3 mm below the CEJ using an acrylic bur to simulated an immature root. The access was restored with bonded resin. Group 3 had the cervical dentin thinned out like group 2 but access was restored with composite 3mm apical to the CEJ using a clear post system. Group 4 was similar to group 3, but the clear post was replaced by an opaque post. Group 5 was similar to group 3, but a metal Dentatus post was cemented in the space left by the clear post. The teeth were then tested to fracture with a faciolingual force using an Instron.

Results: All experimental groups were stronger than the negative control. The opaque post and metal post groups were stronger than the positive control. The bonded resin reinforced the roots from fracture.

C&C: This technique can be valuable in strengthening the tooth against fracture during the apexification procedure. It allows you to get access into the canal space below the composite through the clear post space.

April 1998

Michael J. Mauger

Rud J. Surgical endodontics of upper molars: relation to the maxillary sinus and operation in acute state of infection. J Endodon 1998;24:260-1.

PURPOSE: To report the findings from operating on first maxillary molars, because these teeth are in close relation to the maxillary sinus.

M&M: Two hundred first max molar surgeries, operated on by the author, were evaluated. The state of preoperative infection was evaluated as: chronic, subacute, or acute. The root- end was ground down. Granulation tissue and pus from around the root were carefully removed. Suturing was done with only one or two sutures in the oblique part of the incision, leaving the horizontal part free to allow drainage. If a palatal flap, it was replaced without suturing to avoid swelling.

RESULTS: Perforation to the max sinus was found in half of the cases. Forty-two percent of the cases had acute or subacute infection at the time of surgery. Antibiotics were indicated postoperatively only 5% of the time.

C&C: He recommends approaching the P root from the buccal, even though it means opening into the antrum. The advantages are: minimal root has to be resected and only one flap needed. Antibiotic treatment was seldom used. When sinusitis is present in relation to the teeth, the treatment is to remove the cause.

April 1998

Rodney M. Waite

Selden HS, Manhoff DT, Hatges NA, Michel RC. Metastatic carcinoma to the mandible that mimicked pulpal/periodontal disease. J Endodon 1998;24:267-70.

Summary: A 49 year old male cigarette smoker was admitted to the hospital for shortness of breath, fatigue and fever. He was diagnosed with a pneumonia and given antibiotics. He had some improvements, but returned to the ER several days later with the SOB, left rib and shoulder pain, increased malaise and anorexia. He was admitted with the diagnosis of pneumonia. During his stay in the hospital, he complained of dental pain in #19. It had a radiolucency and was percussion and palpation sensitive. An exophytic mass was protruding from the sulcus. The tooth was extracted and the tissue curetted from the socket. There was no mention of a biopsy or of pulpal vitality tests being performed. After the patient failed to improve, it was found that the patient had a metastatic carcinoma of the lung with the pancreas being the primary tumor. The extraction socket did not heal and was biopsied to find the same metastatic carcinoma. The patient died within 4 weeks from the first visit to the hospital.

C&C: Another case to show the importance of submitting all tissue for biopsy and correlating pulpal tests with what we see clinically and when they don't match ask why don't they.

April 1998

Michael J. Mauger

May

Esber S, Blum J, Chazel J, Parahy E. Effect of masticatory cycles on apical leakage of obturated teeth. J Endodon 1998;24:322-5.

PURPOSE: To determine in vitro the effect of masticatory cycles on the quality of apical sealing.

M&M: A Quick Perfect simulator was adapted to simulate masticatory cycles. Twenty extracted max molars were used. Serial preparation, then obturation by vertical compaction of gutta-percha and Sealite sealer, was completed prior to placing a Ketac Silver restoration. The teeth were embedded in resin with silicon separating them from the resin. Occlusion was completed at 500,000 cycles, 1 million, 2 million and 3 million cycles. One control group was not subjected to masticatory cycles. All roots were placed in methylene blue dye and apical leakage measured.

RESULTS: Dye penetration increased in correlation with the number of masticatory cycles. Leakage was least in the group not subjected to mastication.

C&C: The first group represented 1.36 years of mastication; the last 8.21y. Occlusion has a significant effect on the apical seal, according to this study.

May 1998

Rodney M. Waite

Wadachi R, Araki K, Suda H. Effect of calcium hydroxide on the dissolution of soft tissue on the root canal wall. J Endodon 1998;24:326-30.

Purpose: To evaluate the pulp tissue dissolving effect of a newly developed premix-type Ca(OH)₂ paste.

M&M: 38 bovine extracted mature anterior teeth were used. Two 2 mm long blocks were sectioned from the middle portion of each root. Each block was divided longitudinally into four blocks, making 8 specimens per tooth. Gross pulp tissue remnants on the canal wall were removed with cotton pliers. Specimens were randomly divided into four groups, and treated with either the premix-type Ca(OH)₂ paste, a 6% sodium hypochlorite solution, or a combination of both. Group 1- Ca(OH)₂ application specimens were kept in the solution for either 1, 3, or 7 days and ultrasonically treated with saline for 2 min to remove the Ca(OH)₂ from their surface. Group 2- NaOCl application specimens were ultrasonically treated in saline for 2 min, then soaked in the 6% NaOCl for either 15, 30 or 60 sec at room temp. Group 3- Ca(OH)₂ + NaOCl combination specimens were first treated with Ca(OH)₂ similar to Group 1, then ultrasonically cleaned with saline for 2 min and soaked in NaOCl for 15, 30, or 60 sec. Group 4 was the control group where the specimens were ultrasonically treated with saline for 2 mins. The specimens were fixed and prepared for SEM evaluation.

Results: 7 days in Ca(OH)₂ alone yielded a significantly cleaner score (6.22%) than at 1 or 3 days. 30 to 60 seconds in 6% NaOCl gave a debris score of 3.83% and 2.03% respectively. The combination of Ca(OH)₂ and NaOCl gave a stronger dissolving effect than each chemical alone.

C&C: The authors suggest that a dressing with Ca(OH)₂ for 7 days and irrigation with NaOCl for >30 s during the second visit would provide an optimal effect. This is okay if treating in two visits but 60 sec of NaOCl alone is not much less effective than the two visit combination.

May 1998

Michael J. Mauger

Hosoya S, Ohbayashi E, Matsushima K, Takeuchi H, Yamazaki M, Shibata Y, Abiko Y. Stimulatory effect of interleukin-6 on plasminogen activator activity from human dental pulp cells. J Endodon 1998;24:331-4.

PURPOSE: To investigate the effect of IL-6 on the plasminogen activator (PA) activity of human dental pulp (HDP) cells.

M&M: HDP cells were obtained from surgically extracted teeth. Plasminogen, plasma and PA stimulator were added to the HDP cells and analysis made using Western blot and an RNA kit.

RESULTS: IL-6 stimulated PA activity through an enhancement of tPA (tissue) gene expression and may be involved in extracellular matrix degradation through the stimulation of the PA-plasmin system of HDP cells.

C&C: IL-6 is associated with bone resorption and plasmin is capable of activating latent collagenase. IL-6 may be involved in the extracellular matrix degradation through the stimulation of the PA-plasmin system of HDP cells.

May 1998

Rodney M. Waite

Steinbrunner RL, Brown CE, Legan JJ, Kafrawy AH. Biocompatibility of two apatite cements. J Endodon 1998;24:335-42.

Purpose: To evaluate the biocompatibility, osteoconductive properties, and osteoinductive potential of G-5 and G-6 cements, and to compare these responses to those elicited by Super-EBA that served as a control.

M&M: 90 male rats were divided into three groups of 30 animals each. One group received G-5, the second group received G-6, and the third group received Super-EBA implants. Each animal had two subcutaneous and two bone implants of the same material. 180 discs 2mm thick and 5mm in diameter were used. The materials were allowed to set 60 min for G-5 and G-6, and for 15 min with Super-EBA. 30 animals to be killed 15 days after implantation received Procion Brilliant red 2 days before termination. The remaining rats to be killed 30 and 60 days after implantation received the dye 7 days before termination. The dye was given to label newly formed bone. The specimens were graded on inflammatory response and osteogenesis at the sites.

Results: Subcutaneous implants= After 15 days, Super-EBA and G-6 exhibited slightly greater inflammation than the G-5 specimens. After 30 days, Super-EBA and G-5 specimens exhibited a significantly milder response than G-6. By 60 days, the response of all Super-EBA and G-5 specimens were uniformly mild, whereas G-6 continued to provoke a moderate inflammatory response with the continued presence of giant cells. Osteogenesis was more active with G-5 at 15 days, and osteoid was present at all surfaces. At 30 and 60 days, osteogenesis with G-5 was likewise significantly greater than with either Super-EBA or G-6.

C&C: It seems that G-5 is well tolerated by the tissues and may be used in perforation repairs.

May 1998

Michael J. Mauger

Timpawat S, Sripanaratanakul S. Apical sealing ability of glass ionomer sealer with and without smear layer. J Endodon 1998;24:343-5.

PURPOSE: To compare the sealing ability of a ZOE based root canal sealer and glass ionomer root canal sealer with the presence and absence of smear layer, in association with the use of Thermafil obturators.

M&M: Thirty extracted mandibular first molars (60 canals) were instrumented with step-back technique and 5.25% NaOCl irrigation. The teeth were divided into 6 groups of 10 canals each. The first three groups had smear layer removed with 15% EDTA and a final irrigation of NaOCl. The other groups were only irrigated with the NaOCl. The teeth were obturated with Thermafil as follows: group 1, no sealer; group

2, ZOE sealer; group 3, Ketac-Endo sealer; group 4, Thermafil without sealer; group 5 and 6, ZOE and Ketac-Endo. The sealer set for 24 h, then was immersed in India ink, cleared and dye penetration was measured.

RESULTS: There were no statistical differences between Thermafil used with different sealers or whether or not the smear layer was removed. There was greater leakage in the group that used no sealer with the Thermafil.

C&C: Root canal sealer improved the apical seal of the Thermafil system whether or not smear layer was removed. Ketac-Endo was not significantly different from a ZOE cement.

May 1998

Rodney M. Waite

Kovacevic M, Tamarut T. Influence of the concentration of ions and foramen diameter on the accuracy of electronic root canal length measurement-An experimental study. J Endodon 1998;24:346-51.

Purpose: To examine the effect of different cation concentrations, inside and outside the canal, on the accuracy of measurement in "simulated" tissues of pulp and periapex in relation to the foramen diameter.

M&M: 21 single rooted human teeth were divided into 3 groups of 7 teeth each as follows: Group 1-higher concentration of ions inside the canal and lower outside the canal. Group 2-lower concentration of ions inside the canal and higher outside the canal. Group 3-control group with the same concentration of ions inside and outside the canal. Aqueous solutions of NaOCl, KCl, and CaCl₂ were mixed with agar in 1.8% concentrations. Teeth were filled with the agar of one concentration of ions and placed into the agar of the same or different ion concentration in a small plastic tube. Teeth were fixed into position with a plastic plug. Electronic measurement of tooth canal length was performed in all teeth in the experimental and control groups for the original tooth that had foramen diameters of 0.25mm. The foramens were then enlarged to 0.45, and 0.7 mm and the experiments were repeated.

Results: The higher ion concentration inside of the canal and the 0.25 foramen specimens were significantly more accurate in measuring. The larger the foramen the more measurement error in the control group.

C&C: The changes inside of the pulp with inflammation or necrosis as well as the solutions placed into the canal before electronic apex locator use seem to affect the reading.

May 1998

Michael J. Mauger

Zhang C, Kimura Y, Matsumoto K, Harashima T, Zhou H. Effects of pulsed Nd:YAG laser irradiation on root canal wall dentin with different laser initiators. J Endodon 1998;24:352-55.

PURPOSE: To evaluate the effects of intracanal Nd: YAG laser irradiation with or without initiators on dentin permeability.

M&M: Forty extracted teeth were instrumented with step-back and 5.25% NaOCl and hydrogen peroxide irrigation. Group 1 was control. Group 2 was irradiated. Group 3 had black ink introduced into the canal, then was irradiated. Group 4 had 38%

Ag(NH₃)₂F inserted into the canal then irradiated. Teeth were soaked in rhodamine dye and dye penetration measured. Seven teeth from each group were evaluated under SEM.

RESULTS: Laser treatment alone had no effects on the RC wall. Canals prepared with black ink or Ag(NH₃)₂F revealed melting, smear layer evaporation, and open dentinal tubules.

C&C: Black ink was more effective than Ag(NH₃)₂F as a laser initiator.

May 1998

Rodney M. Waite

Farge P, Nahas P, Bonin P. In vitro study of a Nd: YAP laser in endodontic retreatment. J Endodon 1998;24:359-63.

PURPOSE: To find out if a Nd:YAP laser could improve the retreatment of the root canal system.

M&M: Thirty-three extracted teeth were used. Eight were to specify laser parameters. Three groups of five teeth were prepared with step-back and filled with gutta-percha, ZOE or silver cones. Two groups of five had size #10 and #15 files separated. Laser irradiation and combination laser irradiation and hand instrumentation were used to remove the canal materials. The external temperature of the tooth was recorded. The teeth were prepared for SEM.

RESULTS: On average, the external temperature rose 2.2 to 6.6 °C. Injury to bone occurs when temperature increases 10 °C for 5 min. Laser irradiation in combination with hand instrumentation allowed retreatment to occur in all cases. A clean and regular appearance of the canal resulted. By increasing the power, retreatment time decreased.

C&C: It appears that the laser destroyed the sealer, allowing hand instrumentation to proceed.

May 1998

Rodney M. Waite

Dummer PMH, Al-Omari MAO, Bryant S. Comparison of the performance of four files with rounded tips during shaping of simulated root canals. J Endodon 1998;24:364-71.

Purpose: To compare four stainless steel files used in a balanced force motion during the preparation and shaping of simulated root canals in resin blocks. The effect of file type and canal shape were determined by assessing development of canal irregularities, and the amount and position of resin removed from the canal wall during preparation.

M&M: 160 simulated root canals were instrumented with either Mani Flexile files, Mani SEC-O Files, Maillefer Flexofiles or Zipperer Flexicut Files. There were four canal shapes with 20 or 40 degree curvature and with the curve starting either at 8mm or 12mm from the orifice. Ten canals of each shape were prepared with each file type, making a total of 40 canals for each file type. The canals were prepared in a balanced force motion and a modified double-flare technique with early coronal flaring. Pre- and postoperative images of the canals were taken with a videocamera, and stored and manipulated in a computer with image analysis software. The canals were assessed

for preparation time, instrument failure, blockages, apical extrusion, canal aberrations, amount of resin removed, and transportation.

Results: The Mani SEC-O File has a very rounded non-cutting tip. The shortest preparation time was with the Mani Flexile file. The 40 degree curves took the longest. Most failures occurred with the Maillefer and Zipperer files in sizes 30 and 35. SEC-O files extruded more debris than the other files. SEC-O files created the least zips. Flexofiles created the most perforations.

C&C: Overall the best results from this study were from the SEC-O files; they created the smallest zips, with least removal of material from the outer aspect of the curve and least transportation to emphasize the potential advantage of its extra smooth rounded tip and square cross sectional shape.

May 1998

Michael J. Mauger

Weine FS. *The C-shaped mandibular second molar: incidence and other considerations. J Endodon 1998;24:372-5.*

PURPOSE: The C-shaped mandibular second molar: incidence and other considerations.

M&M: Members of the Arizona Endodontic Association and FW pooled clinical cases of mandibular second molars over a 1 y period for a retrospective study, then prospectively gathered cases over the next 6 months.

RESULTS: In the retrospective study, 25/399 were C-shaped (6.2%). In the prospective study, 37/412 (8.9%) were C-shaped. An overall incidence of C-shaped canals of 7.6%.

C&C: If the buccal portion of the mesial and distal roots are fused then the C is closed to the lingual (opens lingually - why confuse us). If the lingual portion of the roots are fused, the C is closed to the buccal.

May 1998

Rodney M. Waite

Zmener O, Peirano A. *Endodontic therapy in a maxillary second molar with three buccal roots. J Endodon 1998;24:376-7.*

Summary: The authors report a case of a maxillary second molar with 3 separate buccal roots and independent canals. The case emphasizes the importance of preoperative radiographs and paying attention to possible rare variations in anatomy.

May 1998

Michael J. Mauger

Holtzman L. *Conservative treatment of supernumerary maxillary incisor with dens invaginatus. J Endodon 1998;24:378-80.*

PURPOSE: To present a treatment modality that enabled the preservation of pulp vitality by a conservative endodontic approach.

Case Report: A 24 yo male with an Ohlers type II dens in a right maxillary supernumerary incisor required restoration of the carious dens. The pulp responded to vitality testing. All caries were removed and an access cavity made into the dens.

The space was debrided with 3% NaOCl and obturated with amalgam to prevent further contamination. At 5 months all was well.

C&C: Maxillary lateral incisor is most frequently affected by dens invaginatus. Why not used a more esthetic restorative material?

May 1998

Rodney M. Waite

Caaliskan MK. Surgical extrusion of a completely intruded permanent incisor. J Endodon 1998;24:385-4.

Purpose: To evaluate the results of intra-alveolar transplantation by using a conventional extraction and stabilization technique.

Summary: This is a case report of a 10 yr old boy, who intruded tooth #9. He was evaluated by the author 7 days after the trauma. The apex of the tooth was seen protruding from the nasal floor and the crown was not visible clinically. The tooth was surgically repositioned and stabilized with interproximal sutures. Antibiotic therapy for 10 days was initiated. Endodontic therapy was started 21 days post-trauma. Calcium hydroxide was placed into the canal after thorough cleaning and shaping. After 3 months, the canal was obturated with laterally condensed gutta-percha. At the 18 month recall, the tooth shows no sign of ankylosis or root resorption and is completely asymptomatic.

May 1998

Michael J. Mauger

June

Mannocci F, Innocenti M, Ferrari M. Stereomicroscopic and scanning electron microscopic study of roots obturated with vertically condensed gutta-percha, epoxy resin cement, and dentin bonding agent. J Endodon 1998; 24:397-400.

Purpose: 1) to evaluate, in vitro, the presence of the materials and the number of voids present in the coronal, middle, and apical thirds of root canal fillings performed with vertically condensed GP, epoxy resin cement, and dentin bonding agent; 2) to compare these observations with those obtained with conventional root canal fillings performed with vertically condensed GP and epoxy-resin cement; and 3) to evaluate, by SEM, the GP-resin-dentin interface.

M&M: 14 palatal roots were prepared with flexofiles. FM or M GP points were fitted to WL with tugback. Group 1: teeth were etched with 17% EDTA for 1 min; All Bond 2 primer and bond was applied to the canal; the master GP point was coated with AH26 and seated in the canal; vertical condensation was performed with #8-10 pluggers; Obtura 2 was used to backfill. Group 2: same as group 1 but no dental adhesive was used. All teeth were stored for one week then sectioned horizontally. Two operators evaluated the sections for material present and number of voids. Sections from each group were randomly selected for SEM observation.

Results: In group 1, a combination of all 3 materials (GCA) was present in the coronal, middle, and apical third; this was seen more frequently than cement alone (C), adhesive alone (A), or the combination of cement and adhesive. In group 2, a combination of G and C was most frequently seen in the middle and apical third; in

the coronal third, GC & G alone was seen more frequently than C alone. There was no statistically significant difference in the number of voids between the 2 groups. The results of the SEM showed no statistical difference in the presence of a hybrid layer, penetration of resin into the dentinal tubules, or the presence of gaps in the dentin-resin interface.

CC: The use of All Bond 2 with vertically condensed GP resulted in a homogenous distribution of the 3 materials in the apical third; however, there was a lower quality of filling in the coronal third although the number of voids was not statistically significant.

June 1998

Maria D. Santos

Pilo R, Corcino G, Tamse A. Residual dentin thickness in mandibular premolars prepared with hand and rotary instruments. J Endodon 1998;24:401-4.

Purpose: To evaluate the residual dentin thickness (RDT) remaining in the coronal part of the root canal after step-back preparation and the use of GG drills.

M&M: 12 extracted single-rooted mand premolars with one canal were embedded in clear polyester resin, sectioned horizontally at 1, 3, and 5 mm apical to the CEJ and reassembled in a specially fabricated muffle device. The original dentinal widths (M,D,B,L) were measured for each slice. All canals were instrumented using the stepback technique to #40 K-file at the apical end. The coronal 5 mm of the canals were then prepared with a GG-2 and a GG-4 using one continuous single stroke. The slices were disassembled and remaining dentinal thickness measured after use of the #40 file and each GG.

Results: The difference in residual dentin thickness was highly significant with regard to instrument, slice, and direction. In each slice, the width of the mesial side was similar to the distal side; likewise for the buccal to the lingual sides. Reduction of residual dentin thickness in the M-D direction, from the unprepared upper slice to the GG-4 prepared lower slice, was appreciably greater (35%) than in the B-L direction (5%).

CC: The shape of the mand premolar root is ovoid at the cervical and midroot level; the M-D diameter is usually narrower than the B-L direction. Avoid overzealous use of the larger GG's to preserve as much dentin thickness as possible (and reduce possibility of subsequent vertical root fractures).

June 1998

John M. Yaccino

Sobrinho APR, Barros MHM, Nicoli JR, Varvalho MAR, Farias LM, Bambirra EA, Bahia MGA, Vieira EC. Experimental root canal infections in conventional and germ-free mice. J Endodon 1998; 24:405-8.

Purpose: To develop a small animal model for the determination of the interrelationships between ecological components of the root canal in eubiotic and dysbiotic conditions.

M&M: Germ-free and conventional mice were used. The lower incisors were accessed and instrumented from #15 to #30. Viable cells of a selected microorganism (E. Faecalis, E. coli, P. anaerobius, E. lentum, P. endodontalis, F. nucleatum, E. lentum + E. coli, P. endodontalis + E. faecalis, F. nucleatum + E. coli, P. endodontalis + P. anaerobius) were inoculated into the root canals. 5d later, the teeth were opened and cultured.

Results: E. lentum colonized only in CV animals when inoculated alone. P. endodontalis and F nucleatum were unable to colonize in either type of animal after single inoculation.

CC: The experimental model was deemed valuable for ecological studies of root canal infections. Only strict anaerobic bacteria were able to colonize mice root canals when inoculated alone.

June 1998

Maria D. Santos

Lertchirakarn V, Birner R, Messner H. Effects of interleukin-1b on human pulpal fibroblast proliferation and collagen synthesis. J Endodon 1998;24:409-13.

Purpose: To investigate the effects of IL-1 β on human pulpal fibroblast proliferation and collagen synthesis in culture.

M&M: Human pulpal fibroblasts were derived from extracted noncarious 3rd molars. Human dermal fibroblasts were used as a control. The dose response of cells to IL-1 β , and the effects of Indomethacin and serum concentration on response to IL-1 β were evaluated. DNA synthesis was estimated by measuring the incorporation of [³H]thymidine into the cells. Collagen synthesis by confluent cells was determined by measuring the incorporation of [³H]proline into polypeptide chains.

Results: IL-1 β inhibited pulp cell proliferation, but this effect was decreased by the presence of indomethacin. IL-1 β stimulated synthesis of type I collagen both in the absence and presence of indomethacin.

CC: Results suggest the inhibitory effect on pulp cell proliferation is dependent upon IL-1 β induced prostaglandin E₂ synthesis and that IL-1 β is a potent mediator of prostaglandin E₂ synthesis in dental pulp. The primary response of pulp cells to IL-1 β may be the synthesis of prostaglandins rather than proliferation. IL-1 β may have a role in collagen synthesis, but not in the fibroblast proliferation phase of the healing process.

June 1998

John M. Yaccino

Siqueira JF, Batista MMD, Fraga RC, de Uzeda M. Antibacterial effects of endodontic irrigants on black-pigmented gram-negative anaerobes and facultative bacteria. J Endodon 1998; 24:414-6.

Purpose: To compare the antibacterial effects of endodontic irrigants on 4 black-pigmented anaerobes and 4 facultative bacteria commonly found in endodontic infections.

M&M: 0.5% NaOCl, 2.5% NaOCl, 4.0% NaOCl, 0.2% chlorhexidine, 2.0% chlorhexidine, 10% citric acid, and 17% EDTA were evaluated against the following bacteria: *P. endodontalis*, *P. gingivalis*, *Prevotella intermedia*, *Prevotella nigrescens*, *E. faecalis*, *S. mutans*, *S. sanguis*, and *S. sobrinus* via the agar diffusion test. Paper disks soaked in test solutions were placed on the inoculated plates. Plates inoculated with facultative anaerobes were incubated aerobically for 2 d. Plates inoculated with black-pigmented anaerobes were placed in anaerobic jars. Zones of bacterial inhibition were measured.

Results: All solutions were inhibitory against all bacterial strains tested. 4% NaOCl was statistically better than all the other solutions except 2.5% NaOCl which was significantly better than 0.5% NaOCl.

CC: 4% NaOCl > 2.5% NaOCl > 2% chlorhexidine > 0.2% chlorhexidine > EDTA > citric acid > 0.5% NaOCl; (on a petri dish)

June 1998

Maria D. Santos

Kartal N, Özcelik B, Cimilli H. Root canal morphology of maxillary premolars. J Endodon 1998;24:417-9.

Purpose: To investigate further complex root canal anatomy of maxillary premolars using Vertucci's classification.

M&M: 600 extracted max 1st and 2nd premolars (300 of each) were accessed and irrigated with NaOCl, dried, immersed in India ink for 4 days, cleared and inspected using a dissecting light microscope.

Results: Lateral canals were found in the apical third of the root in the majority of samples. The apical foramen was located laterally in 85% of the 1st and in 77% of the 2nd premolars. Of the max 1st premolars, 9.66% had one canal at the apex, 88.64% had two canals, and 1.66% had three canals. Of the max 2nd premolars, 54.99% had one canal at the apex, 44.31% had two canals, and 0.66% had three canals.

CC: Examination of the floor of the pulp chamber gives some clues about existing root canal types. As Vertucci and Gegauff stated, when two orifices are present, their relationship to each other is important: if they are >3 mm apart, the two canals remain separate throughout their length; if the distance is <3 mm, the two canals usually join. The closer the orifices are to each other, the more coronal the union. A new canal type (IX) was introduced in which two separate canals leave the pulp chamber proceeding in separate roots. One canal reaches the apex and the other canal divides into two canal in the apical third and exits at two separate foramina.

June 1998

John M. Yaccino

Delano EO, Tyndall D, Ludlow JB, Trope M, Lost C. Quantitative radiographic follow-up of apical surgery: a radiometric and histologic correlation. J Endodon 1998; 24:420-6.

Purpose: To explore various radiometric computations on sequential digitized radiographs and subtraction images as estimates of healing following treatment of apical periodontitis.

M&M: Baseline and follow-up radiographs taken immediately and at 6 mo. after surgery were obtained from a previous study by Trope on the efficacy of various retrofilling materials. The radiographs were digitized and subtracted. The areas of interest (normal and the apical lesion) were traced, selected, and area measured. The same was done on the follow-up image followed by a superimposition of the delineation map. The gray level measurements were analyzed and compared to the histologic evaluation and objective quantitative histomorphometry of the lesions.

Results: The average gray value of the apical periodontitis significantly correlated with both objective and subjective histology.

CC: "Digital subtraction may be a useful tool in endodontic apical surgery assessment." Obtaining standardized radiographs for DSR may be the limiting factor. *(A bit complicated for me but may be perfect for the computer genius. Quite a ways to go before this becomes practical.)*

June 1998

Maria D. Santos

Arrastia-Jitosho AMA, Liaw LHL, Lee W, Wilder-Smith P. Effects of a 532 nm q-switched nanosecond pulsed laser on dentin. J Endodon 1998;24:427-31.

Purpose: To determine whether a frequency doubled Nd:YAG laser can be used either as an alternative to conventional mechanical methods of root canal treatment or merely as an adjunct to conventional methods of endodontic cleansing and shaping.

M&M: After a preliminary study to determine "safe" laser parameters, the crowns were removed at the CEJ in 27 extracted, human single rooted teeth. These were put into three groups to receive one of the following treatments: 1) untreated; 2) canals minimally prepared using #10 and #15 files; or 3) canals fully prepared to a size #45 file. All roots were then sectioned longitudinally to obtain one complete root half which was laser-treated at various durations and energy densities and then examined by SEM.

Results: Treatment varied from "no effects" to "disruption of the smear layer" to "surface alterations in dentin structures" (thermal damage).

CC: Lasers still aren't ready to replace conventional methods of canal instrumentation.

June 1998

John M. Yaccino

Gambarini G, De Luca M, Gerosa R. Chemical stability of heated sodium hypochlorite endodontic irrigants. J Endodon 1998; 24:432-4.

Purpose: To investigate the effect of heating NaOCl to 50°C on the chemical stability of the irrigating solutions.

M&M: 4 bottles of Niclor 5 ("dental NaOCl") were used. 2 bottles were heated for 30 min at 50°C, allowed to cool then subjected to iodometric titration. The other 2 bottles were not heated. Cl content, density, and pH were measured were measured at 0, 3, 7, 14, 21, and 30 d.

Results: Decomposition rate of heated and nonheated NaOCl did not significantly differ. All exhibited minimal, gradual degradation over time. Mean loss of available chlorine was < 1%. Chemical stability after 30 d was judged to be satisfactory.

CC: Heating NaOCl does not hasten its degradation.

June 1998

Maria D. Santos

Peretz B, Moshonov J. Dental anxiety among patients undergoing endodontic treatment. J Endodon 1998;24:435-7.

Purpose: To evaluate the dental anxiety expressed among patients undergoing endodontic treatment with respect to some social and dental parameters.

M&M: 98 pts (42 men, 56 women) who were referred to an endodontist were examined and completed a Dental Anxiety Scale (DAS) which evaluated the pt's subjective reaction to the dental situation. A dental hx questionnaire was also completed which included questions about dental experience, time of the last visit to the dentist, and whether the tooth being treated had been symptomatic. The DAS scores were evaluated with regard to various social and dental parameters.

Results: The mean DAS scores were higher than scores reported in other countries. Women had higher dental anxiety than men, especially those in their mid-thirties to mid-forties. Pts with 12 yrs or less of formal schooling demonstrated significantly higher DAS scores. No difference was found between pts who had previous endodontic treatment and those who had not, nor in pts who suffered previous pain in the treated tooth and pts who did not.

CC: Halcion may be the answer.

June 1998

John M. Yaccino

Pagavino G, Pace R, Baccetti T. A SEM study of in vivo accuracy of the Root ZX electronic apex locator. J Endodon 1998; 24: 438-41.

Purpose: To assess the accuracy in root canal length measuring of the Root ZX in the presence of vital tissue by means of SEM. Specifically evaluated were the effects of the variation in the position of the foramen (apical versus lateral).

M&M: 35 completely formed, vital, single-rooted teeth, scheduled to be extracted, were used. After anesthesia, the teeth were isolated, accessed via decoronation, openings were enlarged with GG, then irrigated with 2.5% NaOCl. Excess fluid was aspirated and the Root ZX used according to the manufacturer's instructions. After reaching 0 or the "apex", the file was fixed in place with composite. The teeth were extracted,

immersed in NaOCl, and photographed under 40x. The teeth were grouped according to the position of the foramen then prepared for SEM observation.

Results: Absolute precise location of the foramen occurred in only one tooth (had apical foramen). All others protruded between 0.12 and 0.85 mm. None were short of the foramen. Clinical accuracy was 82.75% with a tolerance level of ± 0.5 mm. Mean distance from the file tip to the border of the foramen was 0.395 mm. Group A (apical foramen) had a mean overextension of 0.268 mm. Group B (foramen exited laterally) had a mean overextension of 0.531 mm.

CC: The Root ZX is most accurate in teeth where the foramen is located apically and less so when it exits laterally. Radiographic confirmation of the accuracy of the apex locator is not a valid means of evaluation. High-resolution microscopy is better for research purposes. "0" means you're out. The authors conclude that withdrawal of the instrument 0.5 to 1.0 mm is reasonable to avoid overpreparation.

June 1998

Maria D. Santos

Holtzman L. Radiographic manifestation and treatment considerations in a case of multiple neurofibromatosis. J Endodon 1998;24:435-7.

Case Report: Neurofibromatosis is a neurocutaneous disorder in which there is a peripheral (type I described by Von Recklinghauese) and central (type II) form. Type I is characterized by neural and cutaneous manifestations as well as skeletal, oral and jaw expression. A case is presented in which a 26 yow with a hx of neurofibromatosis received a dental exam. Upon X-ray examination, numerous radiolucent areas were noticed associated with most mandibular teeth. Bilateral enlargement of the mandibular canal was evident. All teeth in association with the radiolucent areas were asymptomatic and vital.

CC: Trust your vitality tests.

June 1998

John M. Yaccino

Orguneser A, Kartal N. Three canals and two foramina in a mandibular canine. J Endodon 1998; 24:444-5.

Case report: A 3rd canal was located in a mandibular canine after an off-angled radiograph was taken to determine if the 2 previously located canals exited separately. The 3rd canal merged with one of the canals. The incidence of type IV mandibular canine has been reported to be 5% (Pineda & Kuttler), 3% (Green), and 6% (Vertucci).

June 1998

Maria D. Santos

Suter B. A new method for retrieving silver points and separated instruments from root canals. J Endodon 1998;24:446-8.

Purpose: To present a new technique for removal of metallic canal obstructions.

Summary: Straight line access to the silver point(SP) or separated instrument(SI) is achieved using GGs. A 1-2 mm circular groove is prepared around the coronal end of the SIs or SPs with ultrasonic tips. A 5-10 mm long cut section of a needle (21 gauge or smaller) is pushed over the exposed end of the SI or SP. A Hedstrom file is pushed using a clockwise rotation through the needle passing beyond the exposed tip of the SI

or SP until the Hedstrom file can't progress any farther. A tight connection should now be established. By pulling on the handle of the Hedstrom file, the three connected objects can be readily removed (or so we hope). This technique may provide more force than can be achieved using the Endo-extractor (cyanoacrylate) technique. Straight line access is a must.

CC: Good technique but definitely not a new technique.

June 1998

John M. Yaccino

July

Filho IB, Esberard RM, Leonardo RdT, del Rio CE. Microscopic evaluation of three endodontic files pre- and postinstrumentation. J Endodon 1998;24:461-4.

Purpose: To evaluate wear characteristics under progressive use and the incidence of breakage during use of stainless-steel and NiTi instruments.

M&M: Size #15, 20, 25, and 30 K-type files, FlexoFile, and Sureflex NiTi files were analyzed using a stereomicroscope unused (to evaluate for defects in machining) and after 1, 3, and 5 instrumentation cycles. Extracted two-rooted max premolars were used. An instrumentation cycle consisted of 200 strokes using a filing motion to working length. Instruments were used sequentially starting with #15, followed by #20, #25, and #30.

Results: Most unused stainless-steel files presented manufacturer defects. Defects appeared in size #15, #20, and #25 K-files and in #15 FlexoFiles after one use. FlexoFiles #20 and #25 and K-files #30 showed defects after three uses. FlexoFile #30 showed defects after five uses. Most of the Sureflex NiTi files did not show appreciable deformities even after being used five times.

CC: Deformation in NiTi instruments is more difficult to observe clinically than in stainless-steel instruments. Authors recommend small-sized stainless-steel files be discarded after a single use and NiTi instruments after five uses. Filing transports canals. NiTi files are not very effective when used in a strictly filing action. Deformation from rotational forces may be more appropriate to look at. The effect of sterilization on the files was not addressed in this study.

July 1998

John M. Yaccino

Iqbal MK, Saad NA. Microleakage of cavit in varnish-lined, matrix-supported endodontic access preparations. J Endodon 1998;24:465-7.

Purpose: To evaluate the effect of a commonly used cavity varnish and matrix band on the microleakage of Cavit in endodontic access cavities with mesial proximal extensions.

M&M: 60 extracted upper premolars were accessed and class II preparations were made. 4-mm of temporary material was placed over a cotton pellet in each tooth. Two premolars were placed in axial contact to simulate the clinical situations.

Group 1 – Cavit only

Group 2 – double layer of varnish followed by Cavit

Group 3 – Tofflemire matrix band followed by Cavit

Group 4 – Tofflemire matrix band, 2 layers of varnish, Cavit

Group 5 – Tofflemire matrix band, 2 layers of varnish, Cavit in 3-4 increments

Group 6 – heat softened GP (positive control)

The teeth were coated (except for the cavity margins), thermocycled in 2% methylene blue, then split longitudinally to measure linear dye leakage.

Results: There was no significant difference in occlusal leakage. The mean proximal leakage of Group 5 was statistically different from the groups that did not use a band and varnish.

CC: The lack of a wall or restraining influence in interproximal preparations is a disadvantage to the high linear expansion of Cavit. Its marginal seal can be improved with the used of a band, varnish, and incremental placement. (*Group sizes were too small to make any kind of conclusion. Someone should have double-checked the graph. Large class II defects are best restored with another material prior to access and temporization with Cavit.*)

July 1998

Maria D. Santos

Torabinejad M, Pitt Ford TR, Abedi HR, Kariyawasam SP, Tang HM. Tissue reaction to implanted root-end filling materials in the tibia and mandible of guinea pigs. J Endodon 1998;24:468-71.

Purpose: To examine the tissue reaction to various root-end filling materials implanted in guinea pigs.

M&M: 20 guinea pigs were used. The root-end materials tested were amalgam, IRM, Super-EBA, MTA. After raising a tissue flap, a small hole was drilled in the tibia or mandible and Teflon cups containing the test materials were implanted. The animals were killed 80 days later and the tissues were evaluated histologically for inflammation, predominant cell type, and thickness of fibrous connective tissue attachment.

Results: The tissue reaction to MTA was most favorable observed at both sites, followed by Super-EBA and IRM (about equal), and amalgam. No inflammation was observed against the MTA implants in both sites. Hard tissue was observed adjacent to 5 of 11 specimens in the tibia and 1 in 10 in the mandibular samples.

CC: Inflammation was recorded as present or absent, not by degree (mild, mod, severe). When observed, the inflammation seen with the other materials was mild. MTA does appear to be very biocompatible. Nothing really new here - this study was very similar to one already done in 1993.

July 1998

John M. Yaccino

Kuruvilla JA, Kamath MP. Antimicrobial activity of 2.5% sodium hypochlorite and 0.2% chlorhexidine gluconate separately and combined, as endodontic irrigants. J Endodon 1998;24:472-6.

Purpose: To compare the antimicrobial efficacy of 2.5% NaOCl and 0.2% chlorhexidine gluconate combined within the root canal to their individual use in vivo.

M&M: 40 single-rooted teeth, all non-vital, with definite periapical radiolucency, and no antibiotic treatment before or during sampling were used. The teeth were accessed, sampled, irrigated, then sampled again.

Group 1 – 2.5% NaOCl, 3 ml

Group 2 – 0.2% chlorhexidine gluconate, 3 ml

Group 3 – 1.5 ml 2.5% NaOCl and 1.5 ml 0.2% chlorhexidine gluconate

Group 4 – 0.9% saline

Results: The number of positive cultures was significantly decreased after irrigation in all 4 groups. Group 1 showed a 59.4% reduction, Group 2 - 70%, Group 3 – 84.6%, and Group 4 – 25%. The differences between 1 & 3 and 2 & 3 were significant.

CC: The antibacterial action of the combined irrigant seemed to be augmented. The authors postulate that the 2 solutions react to form “chlorhexidine chloride.” The ionizing capacity of chlorhexidine increases and the solution increases in pH (pH: 2.5% NaOCl = 9, 0.2% chlorhexidine = 6.5, combination = 10). (*Seems promising from a strictly antimicrobial viewpoint*)

July 1998

Maria D. Santos

Makkawy HAM, Koka S, Lavin MT, Ewoldsen NO. Cytotoxicity of root perforation repair materials. J Endodon 1998;24:477-9.

Purpose: To test the cytotoxicity of three root perforation materials.

M&M: The MTS assay was used to evaluate the effects of three suggested root perforation repair materials (Fuji Duet and Fuji LC - both resin modified GICs, and amalgam) on human PDL cells. Percentages of viable cells for the groups were compared at 24, 48, and 72 hrs.

Results: At 24 hrs, amalgam was significantly more cytotoxic compared to the control and two other tested materials. At 48 and 72 hrs, all three materials exhibited a similar slightly inhibitory effect on the cell viability.

CC: All materials significantly affected cell viability at 24 hr when compared with control values. Authors suggest use of resin-modified GICs may result in a more favorable response by PDL cells than amalgam. It may be difficult to ensure complete curing of a light activated material. MTA is probably the material of choice for root perforation repair at this time.

JULY 1998

John M. Yaccino

Euler GJ, Miller GA, Hutter JW, D'Alesandro MM. Interleukin-6 in neutrophils from peripheral blood and inflammatory periradicular tissues. J Endodon 1998;24:480-4.

Purpose: 1) to determine by immunohistochemical staining whether neutrophils resident in human inflamed gingiva and periradicular lesions produce IL-6, and 2) measure the propensity for IL-6 production by peripheral blood neutrophils cultured with *E. coli* lipopolysaccharide (LPS), and sonicated extracts of periodontal pathogens.

M&M: Isolated neutrophils, from peripheral blood of nondiseased individuals, were stimulated with *E. coli* or bacterial extracts of *Aa* and *P. gingivalis*. The supernatants produced from stimulated and unstimulated neutrophils were assayed by ELISA for IL-

6 content. Periradicular tissues obtained from patients undergoing endodontic surgery were prepared for light microscopic examination; if they contained neutrophils, they were evaluated for IL-6.

Results: Unstimulated neutrophils released minimal IL-6. After stimulation from *Aa* or *Pg*, IL-6 production increased in a dose-dependent manner. More stimulation occurred with *Aa*. Significant levels of IL-6 were produced after stimulation with *E. coli*; however, individuals varied in their response with no clear trends observed. 15-20% of neutrophils associated with periradicular lesions were positive for IL-6.

CC: Periradicular lesions may be sources for IL-6 which may play a role in initiation and progression of periradicular disease.

July 1998

Maria D. Santos

Stewart GG. A scanning electron microscopic study of the cleansing effectiveness of three irrigating modalities of the tubular structure of dentin. J Endodon 1998;485-6.

PURPOSE: To compare the cleansing ability of solutions of aqueous peroxide to RC-Prep reacted with sodium hypochlorite solution and to an improved RC-Prep containing 15% carbamide peroxide (the old RC-Prep has 10% carbamide peroxide).

M&M: Extracted molar teeth (no numbers) were enlarged to a size 40 to the apex and divided into three groups. Group 1- prepared using alternating solution of hydrogen peroxide and 2.5% NaOCl. Group 2 - prepared using 10% carbamide peroxide and 2.5% NaOCl after each instrument. Group 3 - same as 2 but the 15% carbamide peroxide was used. A 5 mm longitudinally cut specimen from the apex coronally was prepared for SEM analysis.

RESULTS: The cleanest tubules were seen in Group 3 followed by Group 2. The specimens in Group 1 did not produce relatively clean dentinal tubules.

C&C: Not extremely scientific or useful. Five references cited (3 from the author).

JULY 1998

John M. Yaccino

Nusstein J, Reader A, Nist R, Beck M, Meyers WJ. Anesthetic efficacy of the supplemental intraosseous injection of 2% lidocaine with 1:100,000 epinephrine in irreversible pulpitis. J Endodon 1998;24:487-91.

Purpose: To determine the anesthetic efficacy of a supplemental intraosseous (IO) injection of 2% lidocaine with 1:100,000 epinephrine in teeth diagnosed with irreversible pulpitis.

M&M: 51 patients participated. All patients had profound lip numbness after administration of anesthesia or after repeat IAN block. If the patients still responded to the cold test/EPT or felt pain in dentin during access, the IO (Stabident) was administered. Each patient rated their level of pain during the procedure and noted if their heart rate increased. Success of the IO was defined as the ability to complete endodontic treatment without pain.

Results: During the Stabident perforation, 92% had no pain or mild pain and 8% had moderate or severe pain. During solution deposition, 96% had no pain or mild pain and 1 patient (4%) had severe pain. 46% noted an increase in heart rate with the IO injections. 81% of the mandibular teeth and 12% of the maxillary teeth required IO injections. Overall, the success rate of the IO injection was 88%.

CC: - good adjunct to consider

July 1998

Maria D. Santos

Rosenberg PA, Babick PJ, Schertzer L, Leung A. The effect of occlusal reduction on pain after endodontic instrumentation. J Endodon 1998;24:492-6.

PURPOSE: To evaluate the effect of occlusal reduction on pain after endodontic instrumentation, and to develop a statistically valid profile of patients most likely to benefit from occlusal reduction.

M&M: 117 pts with posterior teeth requiring endodontic treatment were studied. Teeth were not included if occlusal contacts were not present, if well fitting cast restorations were present, greater than Class I mobility, greater than 5 mm probing depths were present, or the pt was taking antibiotics or pain medication. Preoperative conditions recorded included pulp vitality, percussion sensitivity, periradicular radiolucency, preop pain, swelling, stoma, and history of bruxism. Teeth were randomly assigned to 1 of 3 occlusal treatment groups: total occlusal reduction, simulated occlusal reduction (reduction of nonfunctional cusp), or control (no reduction). After occlusal adjustment, teeth were instrumented, dried, dressed with a cotton pellet, and sealed with Cavit. Pts were given a questionnaire to record their pain level (no pain, mod pain, severe pain) over the following 48 h.

RESULTS: Without regard to any preop clinical finding, 76% of the total occlusal reduction group responded in the no pain category, whereas 50% of the simulated occlusal reduction group and 35.1% of the control group responded in the no pain category. Only 8% of all pts reported severe pain. Occlusal reduction did not appear necessary in teeth preoperatively in the nonvital group, when a periradicular radiolucency was present, when the tooth was not percussion sensitive, or when no preop pain was present. Occlusal reduction should prevent postop pain in those pts whose teeth initially exhibit pulp vitality, percussion sensitivity, preop pain, and/or absence of a periradicular radiolucency.

C&C: It was interesting to note the difference in findings for the simulated reduction and the control group found throughout the study. This may somehow be due to the placebo effect. Occlusal reduction may be beneficial for some patients.

JULY 1998

John M. Yaccino

Reeh ES. Seven canals in a lower first molar. J Endodon 1998;24:497-9.

Case report: A 23 y.o. male presented with a sore tooth on the LLQ. RCT #19 was done in 1989 but the patient reported intermittent gum swellings over the past few years. The present pain was now a constant ache. Pain was reproduced on #19 which had an unusually broad BL dimension that almost equaled the MD dimension. Radiographically, 3 canals were filled and there was apical and furcation radiolucency. Upon initial access to retreat, 3 additional canals were located and on the 2nd appointment, a 7th canal was found. The patient's symptoms improved. The 4 mesial canals were prepared to a size 30 and the 3 distals to a size 50. Healing was apparent at 1 year.

July 1998

Maria D. Santos

Frank AL, Torabindjad M. Diagnosis and treatment of extracanal invasive resorption. J Endodon 1998;24:500-4.

PURPOSE: To describe clinical, radiographic, and histological characteristics that make extracanal invasive resorption (EIR) different from other types of resorption.

SUMMARY: Most EIRs are asymptomatic and found during routine radiographic examination. It may or may not be associated with clinical symptoms (ie tooth

discoloration or a periodontal defect). The pulp tissue is usually vital. Normal responses are usually present with thermal and electrical tests, as well as percussion and palpation sensitivity tests. Radiographically, EIR is an irregular area of resorption in the dentin separated from the canal, and may be superimposed over the root canal. After obturation of the root canal system, the filling material usually remains confined to the canal space. Histological examination of extracted teeth with EIR show irregular resorptive defects in the cementum and dentin which are filled with vascular bone that does not contain inflammatory cells unless there is communication with the oral cavity. A portal of entry for the resorption is present in the cementum adjacent to the PDL. Based on the location of the portal of entry, EIR defects can be classified as supraosseous, crestal, or intraosseous. Debridement and obliteration of the portal of entry and the extracanal defect are the main objectives of therapy. Supraosseous EIR may occasionally be treated with RCT when conveniently located. Crestal EIR debridement should be performed coronally after endodontic therapy. Intraosseous EIR defects have no communication with the oral cavity and, depending on accessibility, may be treated either through the root canal system or by intentional replantation.

C&C: Good article buy nothing new here. Surprised to see no mention of MTA for possible repair of intraosseous EIR.

JULY 1998

John M. Yaccino

August

Rakich DR, Wataha JC, Lefebvre CA, Weller RN. Effects of dentin bonding agents on macrophage mitochondrial activity. J Endodon 1998;24:528-33.

Purpose: To 1) establish the concentrations of altered succinate dehydrogenase (SDH) activity in human THP-1 macrophages in vitro; 2) determine if the effect of time of exposure on these concentrations; and 3) determine if these components had residual effects on SDH activity after they were removed.

M&M: THP-1 macrophages were cultured in the presence of 4 dentin bonding agent (DBA) components (HEMA, 4-META, Bis-GMA, and UDMA) at various concentrations and at various times (24, 48, and 72 h). Mitochondrial function was estimated by measuring the activity of SDH. Residual effects of the components on SDH was also determined.

Results: All the DBA components tested were capable of suppressing SDH activity. UDMA caused suppression at the lowest concentration followed by Bis-GMA, 4-META, and HEMA. Suppression increased with the duration of exposure. All DBA components tested had residual effects.

CC: The authors state that caution is warranted in the clinical use of DBA as root-end filling materials. In sufficient concentrations, unset components can leach out and suppress cell metabolic activities in vitro. *With the problem of moisture control, why bother? Beside, isn't MTA the "cure -all"?*

August 1998

Maria Santos

Yamasaki M, Nakata K, Imaizumi I, Iwama A, Nakane A, Nakamura H. Cytotoxic effect of endodontic bacteria on periapical fibroblasts. J Endodon 1998;24:534-9.

PURPOSE: To apply sonicated bacterial extracts (SBEs) from four different anaerobes to periapical fibroblasts in culture to examine their possible inhibition of cell growth and proliferation.

M&M: Four anaerobic Gram-negative bacteria; *Porphyromonas endodontalis*, *Porphyromonas gingivalis*, *Prevotella intermedia*, and *Fusobacterium nucleatum* were obtained from the apical portion of human PDLs, cultured under strict anaerobic conditions, harvested, and sonicated. A SBE was made of each of the filtered supernatants. Human periapical fibroblasts were cultured from freshly extracted teeth bearing healthy periapical tissue. Each SBE was added to cultures of the periapical fibroblasts. Cell growth and proliferation were measured by the MTT method after 3, 5, and 7 days.

RESULTS: The SBEs from *P endodontalis*, *P gingivalis*, and *F nucleatum* inhibited the growth of the fibroblasts (*P endodontalis* and *F nucleatum* more strongly than *P gingivalis*), whereas the SBE from *P intermedia* did not inhibit growth.

C&C: *P endodontalis*, *P gingivalis*, and *F nucleatum* may participate in the development of periapical lesions. 1st study of its kind on the periapical fibroblast. Sundqvist wouldn't be surprised.

August 1998

John M. Yaccino

Tamse A, Pilo R. A new muffle model system to study root canal morphology and instrumentation techniques. J Endodon 1998;24:540-2.

Summary: A new device, an improved Bramante-type technique, is described. The model consists of a metal stand with 2 orientation pins and 2 stabilizing pins. After mounting a tooth in the middle of the stand with wax, the pins are placed, and a Teflon mold mounts onto the stand. The tooth is embedded in resin, sectioned horizontally, and reassembled with aid of the internal indices. To store the specimens, the stabilizing pins are replaced with bolts of the identical diameter. The authors claim this system with internal indexing is simpler, reproducible, very precise, and versatile.

August 1998

Maria Santos

Koh ET, McDonald F, Pitt Ford TR, Torabinejad M. Cellular response to Mineral Trioxide Aggregate. J Endodon 1998;24:543-7.

PURPOSE: To find out why cementogenesis appears to be induced by MTA by investigating a cell capable of producing matrix, which in turn can be calcified.

M&M: MTA and IRM were prepared and placed in separate Petri dishes. Osteoblasts were seeded into the dishes, which were then incubated for 1, 3, or 7 days. The specimens were viewed by SEM. To evaluate cytokines, cells were grown either alone or in other dishes containing the test materials for 1, 6, 12, 24, 48, 72, and 144 hours. ELISA was used for analysis of IL-1 α , IL-1 β , IL-6, and macrophage colony-stimulating factor.

RESULTS: SEM revealed healthy osteoblasts in contact with MTA at 1 and 3 days, whereas cells in contact with IRM appeared rounded. ELISA assays revealed raised levels of all ILs at all periods when cells were grown in the presence of MTA. Cells grown in the presence of IRM produced undetectable amounts of ILs. The macrophage colony-stimulating factor was produced by both groups.

C&C: No mention in the discussion that both IRM and MTA caused cell death at 7 days.

Mahmoud concludes that MTA offers a biologically active substrate for bone cells and stimulates IL production.

August 1998

John M. Yaccino

Takeda FH, Harashima T, Kimura Y, Matsumoto K. Efficacy of Er:YAG laser irradiation in removing debris and smear layer on root canal walls. J Endodon 1998;24:548-51.

Purpose: To evaluate the efficacy of Er:YAG laser irradiation at two types of power (1 W and 2W) in removing intracanal debris and smear layer.

M&M: 36 extracted human mandibular incisors were prepared to a #55 1-mm short of the foramen and flared using a step-back technique and GG drills. 5.25% NaOCl and 3% H₂O₂ were used alternately as irrigants. Group 1 was not lased. Group 2 were irradiated via optic fiber at a pulse energy of 100 mJ, 1 W, and 10 pulses per second. The apex was treated for 3s then the fiber tip was withdrawn; 4 additional 3-s treatments were made along the root canal walls for a total of 15 s/canal. Group 3 were treated in a similar manner except 2 W of energy was used. The teeth were split longitudinally, dehydrated, and prepared for SEM observation.

Results: Group 1, the control group, showed debris and a heavy smear layer. In group 2, 1 W was effective in removing debris and smear layer in the apical 1/3 but the smear layer was present in some parts of the middle where the optic fiber had not touched the canal walls. Irradiation with 2 W also produced canal walls free of debris and smear layer in the apical 1/3; dentinal tubules were also clean in the middle. The difference between groups 2 and 3 was not significant.

CC: The Er:YAG laser is effective in cleaning the prepared root canal (*if the optic fiber can touch the canal wall*). The authors concede that the laser tip has to be improved.

August 1998

Maria Santos

Ikeda H, Suda H. Subjective sensation and objective neural discharges recorded from clinically nonvital and intact teeth. J Endodon 1998;24:552-6.

PURPOSE: To compare subjective sensation with objective neural discharges recorded by microneurography.

M&M: 30 mand anterior teeth in 16 pts (all age 19-25, dental students or staff, no hx of trauma) were studied. 10 teeth were regarded as apparently nonvital due to discoloration of the crown and lack of response to pulp testing. Cavity preparation did cause pain in each of these teeth. 10 other teeth that responded to pulp vitality tests were used as positive controls. 10 endodontically treated teeth served as negative controls. Pulpal blood flow was recorded with a laser Doppler flow meter.

Electrophysiological neural activity was recorded with an enamel-coated, needle-like tungsten microelectrode that was passed through the mental foramen into the inferior alveolar nerve. EPT, heat and cold tests were also done. Histological examination of the pulps was done on 8 of the pathophysiological teeth (first group).

RESULTS: Only in the 10 positive control teeth did all of the test stimuli produce pain or uncomfortable sensation. Electrical and/or thermal testing activated all of the isolated nerve fibers. In the pathophysiological teeth, vitality testing activated 24 of 30 nerve fibers, but did not produce any sensation, whereas mechanical stimulation of the exposed pulps of these teeth evoked a discharge of impulses in each of the pulpal nerves and produced well-localized pain. Histological examination of the pulps in the pathophysiological group showed that the crown pulps were chronically inflamed, but severe inflammatory cell infiltration was not observed. The root pulp seemed normal.

C&C: Vitality tests can't always be trusted in cases of chronically inflamed but vital root pulps (but are much less invasive than microneurography). Would these partially necrotic teeth be completely necrotic in a few more years?

August 1998

John M. Yaccino

Wu MK, Kontakiotis EG, Wesselink PR. Long-term seal provided by some root-end filling materials. J Endodon 1998;24:557-60.

Purpose: To measure the leakage of a few root-end filling materials in a longitudinal manner during a 1-yr period using a fluid transport model.

M&M: Roots of extracted bovine central incisors were cut into 3-mm sections. After shaping, the lumen of 100 sections were obturated with Tytin amalgam, Fuji II, Hi Dense glass ionomer, MTA, or Super-EBA. The smear layer was removed for all except those filled with MTA. Leakage was measured at 24h, or at 3, 6, or 12 months via a fluid transport model.

Results: At 24h, Fuji II leaked the least; MTA leaked more than amalgam, Hi Dense, or Super-EBA. At the 3- or 6-month interval, amalgam leaked the most; Fuji II and MTA leaked less than Hi Dense and Super-EBA. At the 12-month interval, MTA leaked less than Fuji II and Hi Dense which both leaked less than Super-EBA and amalgam. The percentage of leakage for MTA decreased to 0 in 3 months and this was maintained up to 12 months. Amalgam and Super-EBA increased in percentage of leakage over the first 3 months then decreased with time. Fuji II increased in leakage at 6 months while Hi Dense decreased.

CC: Over the experimental period, both glass ionomers and MTA showed less leakage than amalgam and Super-EBA of which amalgam leaked more.

August 1998

Maria Santos

Cardoso CL, Kotaka CR, Guilhermetti M, Hidalgo MM. Rapid sterilization of gutta-percha cones with glutaraldehyde. J Endodon 1998;24:561-3.

PURPOSE: To examine the effectiveness of five different commercially available 2% liquid glutaraldehyde preparations for rapid chairside decontamination of gutta-percha cones.

M&M: Sterilized size #80 gutta-percha cones (Dentsply and Diadent) were artificially contaminated with *Bacillus subtilis* spores and immersed in Glutaron II, Cidex 28, Glutalabor, Banicide, and Anti-G-Plus for 1, 5, 10, or 15 min in order to compare effectiveness in sterilizing the cones.

RESULTS: Sporocidal activity varied according to the brand of the cones, but after 15 min all the glutaraldehyde solutions were effective in eliminating the *Bacillus subtilis* spores. The Cidex 28, Banicide, and Anti-G-Plus showed sporocidal activity over a shorter period of time (10 min).

C&C: Appears to be an effective method to sterilize gutta-percha cones, although 5.25% NaOCl is faster and probably more practical.

August 1998

John M. Yaccino

Schwartz RS, Murchison DF, Walker WA. Effects of eugenol and noneugenol endodontic sealer cements on post retention. J Endodon 1998;24:564-7.

Purpose: To evaluate the retention of posts cemented with a resin or nonresin cement in teeth obturated with gutta-percha and a eugenol or noneugenol sealer.

M&M: The crown of 60 canines were removed and the roots were prepared to a size 60. Vertical condensation of GP was done with either Roth 801 or AH26. After a minimum of 2 weeks, a 9 mm post space was prepared and the smear layer was removed with EDTA (also may remove residual eugenol). The posts were cemented with either zinc phosphate or Panavia 21. After another 2 weeks of storage, the force required to dislodge the posts was determined on an Instron machine.

Results: The posts cemented with zinc phosphate were significantly more retentive than those cemented with Panavia. There was no difference in retention when only the sealers were considered.

CC: Zinc phosphate produces higher retention values than a resin cement as well as being simpler to use and less expensive. *Does this mean resin-retained posts should be easier to remove?*

August 1998

Maria Santos

September

Yoshida T, Itoh T, Saitoh T. Histopathological study of the use of freeze-dried allogenic dentin powder and true bone ceramic as apical barrier materials. J Endodon 1998;24:581-6.

PURPOSE: To study the use of freeze dried dentin powder and True Bone Ceramics (TBC, prepared by incineration of bovine bone) as apical barrier materials.

M&M: 80 root canals in 53 caries-free premolars in 6 dogs were instrumented to a #40 to the root apex and then a stop was developed with a size #60-70 2 mm from the apex. Some canals received apical barriers of dentin powder or TBC powder followed by obturation with GP and sealer. Control teeth received obturation only. Dogs were killed 1-4 wks or 3 months after and sections were examined under a light microscope.

RESULTS: In the control teeth, apical closure was not seen after 3 months. In the experimental groups, hard tissue had formed on the root canal wall and the filling material after 3 months. The findings suggest that the test materials are nonirritative and compatible with periapical tissue, can induce bone remodeling, and may be clinically applicable as apical barrier materials.

C&C: More studies needed with other animal models. No numbers for control vs experimental teeth in article. An apical stop was able to be prepared in these teeth which confined the material. In the case of a blunderbuss apex, how well would the material be tolerated? What advantages do these materials have over calcium hydroxide; are they any better for the increased cost?

September 1998

John M. Yaccino

Alves J, Walton R, Drake D. Coronal leakage: endotoxin penetration from mixed bacterial communities through obturated, post-prepared root canals. J Endodon 1998;24:587-91.

Purpose: 1) to assess the penetration of post-prepared root canals by endotoxin emanating from mixed bacterial communities and 2) compare and contrast the penetration rate of bacterial endotoxin with bacterial cells derived from these mixed bacterial communities.

M&M: 4 anaerobic bacterial species usually associated with pulp necrosis (*Campylobacter rectus*, *Peptostreptococcus micros*, *Fusobacterium nucleatum*, and *Prevotella intermedia*) were mixed in specific concentrations. 31 extracted caries-free, restoration-free maxillary canines and centrals were accessed, prepared, obturated, and post-space made leaving about 5 mm of GP coronal to WL. A model system with 3 components (upper chamber with bacteria, post-prepared tooth, lower chamber containing HBSS) was used. A limulus lysate assay was used to detect and quantify endotoxin in the samples taken from the lower chamber while a spiral-plating system was used to quantify the bacteria in the samples.

Results: 8/21 (38%) showed endotoxin leakage after 8d increasing to 17 (81%) after 70d. 4/21 teeth (19%) leaked bacteria after 43d, and 14 (67%) after 70d. The mean leakage time was 23d for endotoxin and 62d for bacteria.

CC: Bacterial endotoxin penetrates obturating materials faster than bacteria. An immediate and proper coronal restoration after RCT is stressed. Possible board question?

September 1998

Maria Santos

Serper A, Ücer O, Onur R, Etikan I. Comparative neurotoxic effects of root canal filling materials on rat sciatic nerve. J Endodon 1998;24:592-4.

PURPOSE: To study the neurotoxic effects of various root canal filling materials.

M&M: The sciatic nerves were dissected from rats and mounted in a perfusion chamber and placed on two pairs platinum electrodes that were used for stimulation and recording of compound action potentials (cAPs). The threshold voltage required for evoking a compound nerve action potential was established. The root canal filling materials tested included Endomethasone, N2 universal, Traitement SPAD, Sealapex,

and Calciobiotic Root Canal Sealer. The materials were applied to the nerves until the cAP amplitudes were completely inhibited, after which time the application was discontinued and the tissues were perfused for at least 120 min. Reappearance of the cAPs were recorded.

RESULTS: All of the materials tested gradually inhibited cAP amplitudes and finally produced complete inhibition with different time courses. Time to produce complete inhibition were as follows: Endomethasone - 15.5 min, N2 - 18.5 min, SPAD - 18.2 min, CRCS - 34.3 min, and Sealapex - 49.6 min. The inhibitory effect of Sealapex decreased fastest and 43% maximum recovery was seen in 60-70 min. Endomethasone, CRCS, and N2 showed 10-20% recovery after 2 hrs. SPAD's effects were more persistent with only a 4% recovery after 2.5 hrs.

C&C: Authors conclude that all of the materials tested caused a reversible inhibition of the cAPs, but the materials were removed from contact with the nerves which does not occur in vivo. It would have been nice to include Roth's sealer. SPAD is BAD.

September 1998

John M. Yaccino

Zhang C, Matsumoto K, Kimura Y, Harashima T, Tkeda FH, Zhou H. Effects of CO2 laser in treatment of cervical dentinal hypersensitivity. J Endodon 1998 24:595-7.

Purpose: To evaluate the efficacy of the CO₂ laser in the management of dentinal hypersensitivity.

M&M: 23 patients were asked to evaluate their pain induced by a blast of air on a scale ranging from 0-3 (no discomfort, mild, mod-severe, severe). The patients underwent laser treatment until they were free from pain. Total lasing time ranged from 5-10s for each tooth. The patients assessed their symptoms at 1 wk, 2 wk, 1 mo, and 3 mo after treatment. Patients who were not completely free from hypersensitive pain at the 1- or 2-wk visit were treated again. To assess possible thermal effects, extracted human molars were lased using the same clinical parameters with or without water coolant. Temperature distribution was measured by thermavision thermography.

Results: None of the patients reported a pretreatment pain level of 0 or 3. All patients were free from hypersensitivity immediately after treatment. At the 3-mo visit, about 50% of the teeth were no longer sensitive. No adverse effects were noted and all teeth were vital to EPT at the start and end of the trial. Laser exposure without water coolant resulted in a mean temperature change of $13.5 \pm 1.5^{\circ}\text{C}$ while laser exposure with water coolant resulted in a mean of $-1.8 \pm 0.6^{\circ}\text{C}$.

CC: Although sensitivity recurred in almost half of the cases at the 1-wk visit, the technique is claimed to be simple, quick, and effective with no adverse effects. Its long-term effectiveness needs improvement as noted by the authors.

September 1998

Maria Santos

Kuo M, Lamster IB, Hasselgren G. Host mediators in endodontic exudates. I. Indicators of inflammation and humoral immunity. J Endodon 1998;24:598-603.

PURPOSE: To determine possible relationships between clinical or radiographic findings and the concentrations of different host mediators in endodontic exudates.

M&M: 32 pts with nonvital pulps with periapical symptoms were included in this study. Radiographs were taken and a Periapical Index (PAI) was used. A complete endodontic and periodontal examination was performed. Teeth were accessed and exudates were collected with methylcellulose filter paper strips every 3 minutes. Teeth were characterized as suppurative and nonsuppurative groups. A Clinical Periapical Index (CPI) was developed to quantify clinical findings. Periapical lesions were also designated as small (< 5 mm) or large. The exudate was analyzed for concentrations of the lysosomal acid glycohydrolase β -glucuronidase, IgG, IgA, IgM, and IL-1 β .

RESULTS: The exudates collected from teeth with suppuration, and teeth with higher PAI scores contained higher concentrations of β -glucuronidase and IL-1 β . When the PAI indicated severe involvement, higher IgG was observed in the first samples. The exudates from pts with a sinus tract or swelling contained higher concentration of IgM, compared with pts with only periapical sensitivity.

C&C: β -glucuronidase is a lysosomal enzyme that reflects PMN influx. The results here suggest an important role for PMNs in teeth with suppurative exudates. This technique for collecting exudates was developed for analysis of gingival crevicular fluid by our Perio comrades. Authors say this was a preliminary investigation attempting to establish a protocol for evaluating the host response in endodontic lesions. I'm not sure if they're findings will change our clinical practice to any extent.

September 1998

John M. Yaccino

Chang YC, Huang FM, Cheng MH, Chou LSS, Chou MY. In vitro evaluation of the cytotoxicity and genotoxicity of root canal medicines on human pulp fibroblasts. J Endodon 1998;24:604-6.

Purpose: To investigate the pathobiological effects of camphorated phenol and camphorated parachlorophenol on cultured human pulp fibroblasts in vitro.

M&M: Human dental pulp was obtained from an extracted premolar from a healthy patient. The tissue was processed to yield cell cultures. The cells were seeded in wells and incubated. The culture medium was then replaced with fresh medium containing various concentrations of drugs. After 24h, cytotoxicity was evaluated via a propidium iodide (PI) fluorescent assay and genotoxicity was measured by a DNA precipitation assay.

Results: Camphorated parachlorophenol was more cytotoxic on human fibroblasts than camphorated phenol. Both were toxic to cells but neither demonstrated the ability to break single-stranded DNA during a 24-h incubation period.

CC: The experimental model utilized for testing cellular toxicity & genotoxicity is simple & fast. – *a little rough on the English.*

September 1998

Maria Santos

Mauger MJ, Schindler WG, Walker WA. An evaluation of canal morphology at different levels of root resection in mandibular incisors. J Endodon 1998;24:607-9.

PURPOSE: To determine the prevalence of two canals and an isthmus in mandibular incisors at three levels, and to describe the canal anatomy in a simulated 20° surgical resection.

M&M: 180 mand incisors were embedded in clear casting resin and resected at a 20° facial bevel at 1, 2, and 3 mm from the apex. Remaining organic material was removed and the sections were evaluated after digital imaging at x50 magnification.

RESULTS: The prevalence of two canals was 2% at 1 mm, 0% at 2 mm, and 1% at 3 mm. An isthmus was present 20% of the time at 1 mm, 30% at 2 mm, and 55% at 3 mm. Round, oval, long-oval, and ribbon-shaped canals were seen at the various resection levels. In 75% of the teeth, the canal shape did not remain constant from one level to the next. Generally, the canals were more round or oval closer to the apex and tended to elongate to a long oval or ribbon shape more coronally.

C&C: Standard instrumentation techniques may not adequately prepare canals with an isthmus; CaOH, ultrasonics, and/or NaOCl irrigation should be used to aid mechanical instrumentation and debridement. In surgical endodontics, an isthmus is more likely to be exposed the more coronally the root-end is resected. When two canals are obturated and root-end surgery is performed, the isthmus must be included in the preparation.

September 1998

John M. Yaccino

Nevins A, Crespi P. A clinical study using the collagen gel Zyplast in endodontic treatment. J Endodon 1998;24:610-3.

Purpose: To evaluate a new technique of tissue regeneration into root canals of immature, nonvital teeth using Zyplast collagen gel.

M&M: 4 case reports were presented. All were traumatized, immature, maxillary incisor teeth. After pulpectomy, all teeth were treated with Ca(OH)₂ for at least 6 months. After all clinical signs of infection were no longer evident, the teeth were filled with Zyplast collagen gel. The teeth were closed with sylastic disc and IRM and observed for 1, 3, 6, and 12 months, and 2 and 3 years.

Results: 3 of the 4 cases demonstrated a modest amount of hard tissue formation. The limited results differed from previous studies in vital, uninfected monkey teeth.

CC: Zyplast is a reconstituted, cross-linked, bovine dermal collagen used by dermatologist to correct wrinkles, scars, and other contour defects. From the results of this clinical trial, Zyplast probably does not have the capacity to overcome dental inflammation/infection.

September 1998

Maria Santos

Eleazar PD, Eleazer KR. Flare-up rate in pulpally necrotic molars in one-visit versus two-visit endodontic treatment.

PURPOSE: To compare the flare-up rate in single vs two-visit endodontic treatment.

M&M: 402 consecutive patients with necrotic 1st or 2nd molars were compared. In half of the patients, single-visit therapy was performed; in the other half endodontic therapy was completed in two visits. All patients were treated by the same endodontist

who employed step-back filing to at least a #30 at the apex, using RC Prep and 0.5% NaOCl. Metacresylacetate was used as an intracanal medicament with two-visit therapy. Sealapex was used with laterally condensed gutta-percha. Flare-up was defined as postop pain not controlled with OTC medication or as worsening swelling.

RESULTS: 16 flare-ups (8%) occurred in the two-visit group vs 6 (3%) in the single-visit group.

C&C: Single-visit looks good here. Antibiotic use seemed awfully high.

September 1998

John M. Yaccino

Lee FS, Van Cura JE, BeGole E. A comparison of root surface temperatures using different obturation heat sources. J Endodon 1998;24:617-20

Purpose: To compare temperature changes on the root surface during compaction of gutta-percha using the System B Heat Source with vertical condensation. The Touch 'n' Heat and a flame-heated endodontic carrier were also evaluated. The influence of dentin thickness and heat conduction to the external root surface was also assessed.

M&M: 30 extracted single-rooted teeth were accessed and prepared with .06 Profiles. Each was filled with vertically condensed GP to within 5 mm of WL using 3 heat sources – System B, Touch 'n Heat, or a flame-heated endodontic carrier. Temperature on the lateral root surface was recorded by using a digital readout thermometer placed on the root surface 2 mm below the CEJ with light-cured composite. After temperature measurement, the GP was removed using Hedstrom files. Each tooth was obturated with each heat source. After completion of the temperature recordings, the teeth were sectioned and the remaining dentin thickness measured.

Results: Mean temperature rise °C:	System B	6.99 ± 2.02
	Touch 'n Heat	9.19 ± 2.97
	Flame	21.43 ± 3.91

The mandibular incisors always had the highest readings, whereas the maxillary incisors and premolars varied (due to remaining dentin thickness). System B surface temperature was < 10° for all experimental teeth; Touch 'n Heat was < 10° for the maxillary incisors and premolars but not for the mandibular incisors; the flame-heated instrument surface temperature was >10° for all experimental teeth.

CC: Since a temperature rise of > 10° , when transmitted to the external surface of a root, could be responsible for damage to the supporting alveolar bone (Eriksson & Albrektsson) the authors caution use of the Touch 'n Heat and a flame-heated instrument in lower incisors. Damage to the attachment apparatus may occur if teeth with large diameter canals and thin dentinal walls are obturated with a heated instrument. Excessive tapering may also result in thin walls and thus greater transfer of heat.

Pro – System B article.

September 1998

Maria Santos

October

Kuo ML, Lamster IB, Hasselgren G. Host mediators in endodontic exudates. II. Changes in concentration with sequential sampling. J Endodon 1998;24:636-40.

Purpose: To evaluate the sequential changes in inflammatory and humoral immune mediators in endodontic exudates when accessing the root canal and to correlated them to clinical and radiographic findings.

M&M: Patients with nonvital teeth with periapical symptoms, including periapical tenderness, swelling, and/or presence of a "fistula"/sinus tract were sampled. Upon access, endodontic exudates were collected with filter paper slips. Five mediators were studied (β -glucuronidase, IgG, IgA, IgM, IL-1 β).

Results: 14 teeth had suppurative and 18 had non-suppurative exudate. Teeth with suppurative exudate had decreasing β G and IL-1 β and increasing IgA and IgM. Teeth with nonsuppurative exudate had mediators that did not change. Patients with perc/palp sensitivity had increasing IgM while patients with swelling/sinus tracts had increasing IgM and IgA. Mediators from radiographically smaller lesions did not change except for IgG which tended to increase. Larger lesions had increasing IgA, IgM, but not IgG. The IgG/IgA and IgG/IgM ratios were higher in exudate when compared to normal human serum.

CC: β G is a marker for primary granule released from PMNs. Locally produced IgG may play a role in periapical exacerbations. IgM seems to be a marker of the severity of a periapical lesion. IgG/IgM ratio may serve as an index for the severity of periapical lesions. The increase in IgM may be due to increased vascular permeability

October 1998

Maria Santos

Zhu Q, Safavi KE, Spangberg LSW. Integrin expression in human dental pulp cells and their role in cell attachment on extracellular matrix proteins. J Endodon 1998;24:641-4.

PURPOSE: To identify the expression of integrins in human pulp cells and their role in pulp cell adhesion to the extracellular matrix proteins, laminin and fibronectin.

M&M: Human dental pulp cells were grown from dental pulp tissue obtained from extracted impacted third molars. Integrin expression was studied by immunoblot and immunoprecipitation using monoclonal integrin antibodies. The role of integrin in human dental pulp cell adhesion on laminin and fibronectin was determined by inhibition of cell adhesion with those antibodies.

RESULTS: Human dental pulp cells expressed α_1 , α_3 , α_5 , α_6 , α_v , and β_1 integrin subunits. The adhesion of human dental pulp cells to laminin and fibronectin was not inhibited by monoclonal antibody to any subunit, except that anti- β_1 antibody inhibited pulp cells adhesion on laminin.

C&C: The detection of different integrin subunits suggests integrins could mediate adhesion and migration of human pulp cells.

October 1998

John M. Yaccino

Yokose S, Zhungfeng C, Tajima Y, Fujieda K, Katayama I, Katayama T. The effects of estrogen deficiency on glycosylation of odontoblasts in rats. J Endodon 1998;24:645-7.

Purpose: To determine whether or not estrogen deficiency influences the odontoblast metabolism.

M&M: 12 female rats were either ovariectomized or sham-operated. After 35 d, the animals were killed, the serum levels of estrogen were measured, and the mandibles processed for lectin histochemistry, and bone mineral density (BMD) was determined on the femurs via x-ray absorptionmetry.

Results: After ovariectomy, BMD was significantly decreased and the estrogen level was markedly decreased (thus corresponding to postmenopausal osteoporosis). PNA (peanut agglutinin) binding sites were detected in the odontoblasts in incisors of OVX and sham rats; the reaction was stronger with the OVX rats. This binding reflects the glycosylation of proteoglycans (PG) in odontoblasts.

CC: Estrogen deficiency increases the galactosyl glycosylation of PG.

October 1998

Maria Santos

Waite RM, Carnes DL, Walker WA. Microleakage of TERM used with sodium perborate/water and sodium perborate/suberoxol in the walking bleach technique. J Endodon 1998;24:648-50.

PURPOSE: To determine how well TERM seals in the walking bleach technique.

M&M: Extracted premolars were restored with TERM over 1) a cotton pellet, 2) a paste of sodium perborate and water, or 3) a paste of sodium perborate and superoxol in the chamber and evaluated at various times for leakage with a fluid filtration apparatus (courtesy of R. Retledge).

RESULTS: Both walking bleach groups leaked significantly more than the control.

C&C: O₂ release probably affects the seal. Don't use TERM with the walking bleach technique.

October 1998

John M. Yaccino

Shadid DB, Nicholls JJ, Steiner JC. A comparison of curved canal transportation with balanced force versus Lightspeed. J Endodon 1998;24:651-4.

Purpose: To compare 2 different file types, Flex-R to the Lightspeed, to observe their postinstrument effect on canal movement when used in curved canals.

M&M: Forty curved M or MB roots of extracted 1st and 2nd maxillary and mandibular molars were used. Only canals with unidirectional curvature between 20° and 35° were selected. The roots were embedded in clear resin (Bramante technique), sectioned, and photographed. Twenty canals were prepared to a standardized apical preparation of #45 using the balanced force technique (BFT). The remaining were prepared with the Lightspeed using the same size instruments at the same levels as

with the BFT. Pre- and postinstrumentation slides were traced and analyzed via a computer program to determine the extent of canal center movement.

Results: In the apical sections, the Flex-R and Lightspeed canal centers had an average movement of $0.099 \pm 0.075\text{mm}$ and $0.055 \pm 0.036\text{mm}$. The difference was significant with the LS demonstrating less movement. No significant difference was noted in the coronal sections. Postinstrumentation canal area in the apical section was $0.377 \pm 0.149 \text{ mm}^2$ for the Flex-R and $0.258 \pm 0.096 \text{ mm}^2$ for LS; the difference was significant. No significant difference was noted in the coronal postinstrumentation canal areas. No significant correlation was found between the angle of root curvature and canal movement or the angle of root curvature and postinstrumentation canal area.

CC: *No surprises here. LS transports less due to its unique design.*

October 1998

Maria Santos

Antonopoulos KG, Attin T, Hellwig E. Evaluation of the apical seal of root canal fillings with different methods. J Endodon 1998;24:655-8.

PURPOSE: To compare the apical leakage obtained by different methods for dye penetration.

M&M: Extracted max incisors were uniformly instrumented and obturated with either lateral condensation or a single cone technique, both using AH26 plus as sealer. Linear leakage was assessed by 1) passive exposure to India ink, 2) exposure to India ink under negative pressure, or 3) exposure to Rhodamine B dye mixed with epoxy resin under high pressure conditions. All teeth were evaluated after clearing.

RESULTS: No significant differences were recorded between the passive and negative pressure techniques while significantly lower dye penetration was seen using dye penetration under high pressure conditions. No statistically significant differences were seen between either obturation methods although lateral condensation technique had less leakage.

C&C: Nothing earth shattering here. Results from one leakage study cannot be compared with results from another leakage study.

October 1998

John M. Yaccino

Pisano DM, DiFiore PM, McClanahan SB, Lautenschlager EP, Duncan JL. Intraorifice sealing of gutta-percha obturated root canals to prevent coronal microleakage. J Endodon 1998;24:659-62.

Purpose: To evaluate whether Cavit, IRM, and Super-EBA as intraorifice filling material can prevent coronal microleakage of human saliva and its' components in the absence of a coronal restoration.

M&M: 74 extracted single-rooted teeth were sterilized, accessed, prepared to a size #40, dried, and obturated with laterally condensed GP and Roth's 801. 3.5mm of GP was removed from each orifice. After setting for 72h, each tooth received 3.5mm of either Cavit, IRM, or Super-EBA (n=20). Human saliva was introduced into each access opening while the apical 2mm was immersed in sterile trypticase soy broth.

Saliva was replenished every 24-48h. Bacterial leakage was indicated by an increase in turbidity.

Results: 2 unobturated, unsealed controls leaked within 48h. The 5 obturated unsealed controls leaked in 49 d or less. The negative controls remained leakage-free for 90d. 15% leaked in the Cavit group, whereas 35% leaked in both the IRM and Super-EBA groups. All other experimental samples remained leakage-free at 90d.

CC: Intraorifice seals could prevent microleakage and extend the leakage-free time period before restorative treatment is initiated. *Not a bad idea for some of the retirees that might not seek restorative care in a timely fashion; otherwise beware the wrath of the restorative dentist.*

October 1998

Maria Santos

Siqueira JF, deUzeda M. Influence of different vehicles on the antibacterial effects of calcium hydroxide. J Endodon 1998;24:663-5.

PURPOSE: To evaluate the influence of different vehicles on the antibacterial effects of calcium hydroxide using a broth dilution test.

M&M: Calcium hydroxide powder was mixed into a paste-like consistency with the following vehicles: 1) saline solution, 2) glycerine, or 3) CPMC and glycerine. Antibacterial effects of these pastes and a saline control were evaluated against *Porphyromonas endodontalis*, *Prevotella intermedia*, *Streptococcus sanguis*, and *E. faecalis* using a broth dilution test. Time intervals of 5 min, 30 min, 1 h, 1 day, and 3 days were evaluated.

RESULTS: All CaOH pastes were effective in killing the bacteria tested but this effect varied with time. The CaOH/CPMC/glycerine paste was the most effective. Bacteria survived for 3 days in the saline.

C&C: It still took at least 1 hr for the CaOH/CPMC/glycerine paste to kill all 4 strains vs 1 or 3 days for the other pastes. As an interappointment intracanal medicament, 1 hr vs 3 days is not significant to me. I'll stick with something convenient like Pulpdent.

October 1998

John M. Yaccino

Lin CP, Chou HG, Kuo JC, Lan WH. The quality of ultrasonic root-end preparation: a quantitative study. J Endodon 1998;24:666-70.

Purpose: To compare quantitatively the quality of root-end preparations prepared by ultrasonic retrotip with those prepared by a conventional microhandpiece bur.

M&M: 20 extracted maxillary molars with roots containing 2 canals and an isthmus were used. The canals were cleaned, shaped, and obturated. A 3-mm root-end resection was made perpendicular to the long axis of the root. After examination and capturing of the preoperative images, the teeth were assigned to 2 groups. 10 were prepared using a slow-speed microhandpiece with a no. 008 bur. The remaining were prepared using a CT-5 retrotip on the EIE unit. Preparations were considered complete when 3-mm deep class I cavities were accomplished with no visible GP remaining on the cavity walls. Each root was evaluated under a stereomicroscope by 2

independent evaluators. The images were captured and the percentage mean increase in size of the root-end preparations was calculated.

Results: Mean minimal thickness of remaining dentinal wall after root-end preparations: 0.173 mm with the microhandpiece & 0.427 mm with the ultrasonic. Percentage increase in size: 615.634% with the microhandpiece & 326.629% with the ultrasonic. Total loss of tooth structure: 30.014% with the microhandpiece & 17.517% with the ultrasonic. All the differences were significant. 3 of the microhandpiece specimens had root perforations in the isthmus area.

CC: Ultrasonic root-end preparations produce quantitatively more conservative and less perforated cavities. *Nothing new. I thought we were past this. Can't believe someone got a grant for this.*

October 1998

Maria Santos

Rud J, Rud V, Munksgaard EC. Retrograde sealing of accidental root perforations with dentin-bonded composite resin. J Endodon 1998;24:671-7.

PURPOSE: To examine the healing results of surgical Gluma Retroplast seals of iatrogenic root perforations which were not suited for immediate orthograde treatment.

M&M: 100 iatrogenic root perforations were repaired as mentioned and reexamined after 1 yr and if necessary after 18 months to 11 yrs. None of the perforations were referred for treatment immediately after the accident. 94 cases showed radiolucency of the bone adjacent to the perforation and 83 the presence of an exposed post.

RESULTS: In 65 teeth having perms other than in the furcation area, complete healing was seen in 71%, partial healing in 11%, uncertain healing in 3%, and failure in 15%. These results were much better than seen for perforations at the furcation: 30% complete, 41% partial, 11% uncertain, and 18% failure.

C&C: Authors did their own radiographic evaluations. More Retroplast from Rud and company.

October 1998

John M. Yaccino

Chan CP, Tseng SC, Lin CP, Huang CC, Tsai TP, Chen CC. Vertical root fracture in nonendodontically treated teeth - a clinical report of 64 cases in Chinese patients. J Endodon 1998;24:678-81.

Summary: 64 cases of vertical root fractures (VRF) in nonendodontically treated teeth in Chinese patients were reviewed. The patients ranged from 34-83 years (mean 54). All VRF occurred in the posterior teeth. 81% had no restorations. 57 (89%) occurred in molars and 11% occurred in premolars. In the maxillary molars 76% of the VRF occurred in the MB roots. In the mandibular molars, 91% occurred in the mesial roots. Various signs and symptoms were tabulated; 84% had deep probing depths, 52% reported mild pain, and 63% had angular osseous defects. 86% were extracted and 8% were retained by root resection. The remaining had periodic recalls after diagnosis. This study had a greater incidence of VRF in males (2:1). This was attributed to strong masticatory force, the tendency to chew harder food, the presence of severe attrition, and increased bone density. VRFs occurred most often in thin or flat roots with smaller mesiodistal diameter.

October 1998

Maria Santos

November

Bachicha WS, DiFiore PM, Miller DA, Lautenschlager EP, Pashley DH. Microleakage of endodontically treated teeth restored with posts. J Endodon 1998;24:703-8.

PURPOSE: To measure by fluid filtration the microleakage of different post systems cemented with various cements.

M&M: 120 extracted single-rooted teeth had crowns removed and were prepared uniformly. Stainless-steel or carbon-fiber posts were cemented with zinc phosphate, glass ionomer, Panavia, or C&B Metabond cements. After 24 hrs, microleakage was measured using a fluid filtration system.

RESULTS: Zinc phosphate cement showed the most leakage, followed by the GIC, and Panavia. C&B Metabond showed the least microleakage. There was no significant differences between the two post systems.

C&C: One of the benefits of fluid filtration is that measurements can be made over extended time periods. It might have been interesting to see how the various cements did over time. No gutta-percha and sealer were used in this study. Sealer use may have effected the results with the resin cements.

November 1998

John M. Yaccino

Chang MC, Lin CP, Huang TF, Lan WH, Lin YL, Hsieh CC, Jeng JJ. Thrombin-induced DNA synthesis of cultured human dental pulp cells is dependent on its proteolytic activity and modulated by prostaglandin E2. J Endodon 1998;24:709-13.

Purpose: To investigate the mechanisms that mediate thrombin-stimulated DNA synthesis of pulp cells and whether is mitogenic effect is modulated by PGE2.

M&M: Human dental pulp cells and periodontal cells (obtained from extracted 3rd molars) were cultured. After 24h, α -thrombin or PGE2 was added, and DNA synthesis was measured. To study the expression of thrombin receptor, RNA isolated from cultured cells were subjected to RT-PCR with thrombin receptor-specific primers. To test the effects of various modulators, PPACK, PGE2, and antithrombin with heparin were added to the culture medium before α -thrombin.

Results: α -thrombin stimulated DNA synthesis 1.3- to 2.6x (plateau reached at a concentration of 25 units/ml). Thus, thrombin is a mitogen for pulp cells. Pulp and periodontal cells expressed a thrombin receptor mRNA. PPACK and antithrombin III/heparin suppressed DNA synthesis while exhibiting little cytotoxicity. Preincubation with PPACK for 30 min completely suppressed thrombin-induced DNA synthesis while pretreatment with PGE2 for 30 min suppressed synthesis by 39-64%.

CC: Pulp cells express the thrombin receptor that is activated by the serine protease activity of thrombin. PGE2 and thrombin act together to regulate pulp tissue repair and regeneration. *No comment.*

November 1998

Maria Santos

Joyce AP, Loushine RJ, West LA, Runyan DA, Cameron SM. Photoelastic comparison of stress induced by using stainless-steel versus nickel-titanium spreaders in vitro. J Endodon 1998;24:714-5.

PURPOSE: To develop a model to demonstrate the location and distribution of stresses created upon lateral condensation in curved canals using stainless steel or NiTi spreaders.

M&M: 20 simulated, tapered canals were created in photoelastic acrylic resin. A master GP cone and sealer were placed in the canals. Size 30 finger spreaders of stainless steel or NiTi were mounted in an Instron machine to apply a vertical force of 20 Newtons to the spreaders. Quarter wave and polarizing filters were used with backlighting to generate the fringe patterns. Slides were taken and viewed on a screen using side-by-side projectors to compare the fringe patterns.

RESULTS: The stainless-steel spreaders created three areas of concentrated stress. The NiTi spreaders caused stress to be spread out along the entire length of the surface contacted by the spreader, except for a concentrated area at the tip.

C&C: NiTi spreaders may reduce the concentration of stress and the potential for vertical root fractures. How many root fractures are caused by stainless-steel finger spreaders? Would be interesting to see the fringe pattern with a D11 spreader with the same vertical force.

November 1998

John M. Yaccino

Yatsushiro JD, Baumgartner JC, Tinkle JS. Longitudinal study of the microleakage of two root-end filling materials using a fluid conductive system. J Endodon 1998;24:716-9.

Purpose: To evaluate the microleakage of MTA and an admixture high copper amalgam in root-end preparations using a fluid conductive method over a 24-wk period.

M&M: Matched pairs of extracted anterior teeth were prepared and obturated with gutta-percha. The root-ends were resected and a 3-mm deep root-end preparation was made with ultrasonics. One tooth from each pair was filled with either amalgam or MTA. The negative controls were coated with a layer of dentin bonding agent and wax while the positive controls were left unfilled. After storing for 72h, the GP fills were removed and leakage was measured via a fluid filtration method.

Results: The amalgam groups leaked 50-8 – 84.1 nl/min \pm 104.6 104.6 – 198.4 nl/min while the MTA group leaked 6.8 – 10.8 nl/min \pm 6.5 – 8.1 nl/min. The difference was significant. The amalgam group tended to increase in leakage over time while the MTA group showed no trend.

CC: Once again, MTA was better.

November 1998

Maria Santos

Maguire H, Torabinejad M, Mckendry D, McMillan P, Simon JH. Effects of resorbable membrane placement and human osteogenic protein-1 on hard tissue healing after periradicular surgery in cats. J Endodon 1998;24:720-5.

PURPOSE: To determine the effects of resorbable membrane placement and osteogenic protein hOP-1 on hard tissue healing after periradicular surgery in cats.

M&M: 24 max cuspids in 12 cats had periradicular lesions induced and verified radiographically. Root canals were cleaned and shaped and obturated with GP and Roth's sealer. Flaps were reflected and apical cortical and cancellous bone was removed in a standardized fashion. After root-end resection and removal of the lesion, 3 mm deep root end cavities were prepared with a 1/2 round bur and filled with MTA. 8 of the osteotomy sites were covered with a Guidor resorbable membrane. 8 other sites were filled with hOP-1 on a collagen carrier. The remaining 8 sites served as controls. Cats were killed after 12 wks and the osteotomy sites examined histomorphometrically.

RESULTS: The sites treated with the membrane had significantly more inflammation adjacent to the root ends and the use of the membrane had no significant effect on osseous healing or new cementum formation. The use of hOP-1 was associated with a significant decrease in the thickness of cementum formed on the resected root ends, but had no significant effect on osseous healing or degree of inflammation.

C&C: Neither the use of human osteogenic protein nor resorbable membranes have a positive effect on periradicular healing (at least in cats). A cementum-like material was observed growing over the MTA in 16/24 specimens. No need to jump on the "membrane bandwagon" for routine apical surgery. Excellent study.

November 1998

John M. Yaccino

Gagliani M, Taschieri S, Molinari R. Ultrasonic root-end preparation: Influence of cutting angle on the apical seal. J Endodon 1998;24:726-30.

Purpose: To determine if the angle of root-end resection has a significant bearing in reducing leakage in patent tubules or in the area between the root-end filling and dentin.

M&M: 48 extracted single-rooted premolars were prepared and filled with gutta-percha. All were sectioned 3-mm from the apex either at a 45° or 90° angle then filled with Super-Seal (ZOE reinforced with benzoic acid and alumina, aka SuperEBA). The root ends were treated with 17% EDTA in preparation for the filtration test. The negative controls were covered with nail polish while the positive controls were left unfilled. All were soaked in fuchsin for 24h then split longitudinally and observed under a stereomicroscope.

Results: There was less leakage in dentin and in the space between the filling and the dentinal wall in the group with a 90° bevel. Only the dentin leakage was significant. None leakage past the depth of the preparation.

CC: A 3-mm apical seal is good regardless of whether the resection angle is 90° or 45°. *Nothing new.*

November 1998

Maria Santos

Haikel Y, Serfaty R, Wilson P, Speisser JM, Allemann C. Mechanical properties of nickel-titanium endodontic instruments and the effect of sodium hypochlorite treatment. J Endodon 1998;24:731-5.

PURPOSE: To determine the cutting efficiency of 4 brands of NiTi endodontic files in the presence and absence of NaOCl, and compare them to a conventional stainless-steel K-type file.

M&M: The four brands of NiTi tested were Brassler, JS Dental, McSpadden, and Maillefer. In one part of the study, files were exposed to NaOCl for 12 or 48 h or not at all. Cutting efficiency was measured for Plexiglass plates with a specially designed mechanical apparatus. Cutting efficiencies were assessed using a new methodology: mass of Plexiglass cut per energy used over 50 linear cutting motions.

RESULTS: NaOCl treatment did not alter the cutting efficiency of any of the tested instruments. Brassler and Maillefer were the most efficient NiTi files. All NiTi files were less efficient when compared to conventional stainless-steel instruments.

C&C: Maybe NiTi will cause less (or at least slower) canal transportation.

November 1998

John M. Yaccino

Haikel Y, Serfaty R, Wilson P, Speisser JM, Allemann C. Cutting efficiency of nickel-titanium endodontic instruments and the effect of sodium hypochlorite treatment. J Endodon 1998;24:736-9.

Purpose: To determine objectively the cutting efficiency (mass of Plexiglass cut per unit energy used by the test file) of 4 brands of commercially available NiTi endodontic files in vitro. Cutting efficiency was also assessed as a function of corrosion resistance with NaOCl.

M&M: Brasseler NiTi, JS Dental NiTi, McSpadden NiTi, and Maillefer files (all #30) were gripped between 2 Plexiglass plates then withdrawn under constant water irrigation. The plates were connected to a force transducer to record the force exerted. Another group of files was tested in the same manner after soaking in 2.5% NaOCl for 12 and 48h.

Results: In the absence of NaOCl, Brasseler (318 µg/J) and Maillefer (280 µg/J) files were most efficient followed by JS Dental (71.4 µg/J) and McSpadden (40 µg/J). NaOCl did not significantly alter the cutting efficiency of any brand. When compared to conventional stainless steel files (data from 1996 study), all NiTi files tested were less efficient.

CC: The differences in cutting efficiency may be due to differences in alloy composition. NiTis are less efficient than SS. *Soaking files in NaOCl is really not clinically relevant*

November 1998

Maria Santos

Sauveur G, Boccara E, Colon P, Sobel M, Boucher Y. A photoelastimetric analysis of stress induced by root-end resection. J Endodon 1998;24:740-3.

PURPOSE: To evaluate the profiles of the mechanical stresses developed around the apices of teeth subjected to two types of apical resection, compared with an intact tooth.

M&M: 3 models representing bucco-lingual slices of the same max central incisor were prepared in a 6 mm thick sheet of photoelastic material and were joined to an artificial alveolar socket of the same material with silicone to simulate the resilience of the PDL. The apices of 2 of the models were cut at a 45° or 90° angle. The other model was left intact. The models were analyzed by photoelastimetry under a force of 150 N. Isochromatic fringe patterns were evaluated.

RESULTS: A section of the root-end through a plane perpendicular to the long axis of the tooth (90°) offers a better distribution of the stresses exerted on the apical region than the use of an inclined plane (45°).

C&C: Authors say that mechanical stresses may provoke or favor an osteoclastic process and a long-lasting osseous rarefaction. Maybe. There may be more important scientific reasons to keep your bevel to a minimum.

November 1998

John M. Yaccino

Hu CC, Zhang C, Qian Q, Tatum NB. Reparative dentin formation in rat molars after direct pulp capping with growth factors. J Endodon 1998;24:744-51.

Purpose: To compare the dental pulp responses to direct pulp-capping medications containing specific growth factors or calcium hydroxide.

M&M: The following growth factors were tested: mouse epidermal growth factor (MEGF), human recombinant basic fibroblast growth factor (rbFGF), human recombinant insulin-like growth factor-II (rIGF-II), human recombinant platelet-derived growth factor BB (rPDGF-BB), and human recombinant transforming growth factor- β_1 (rTGF- β_1). The factors were dissolved in sterile water and carried to the exposure site via an absorbable collagen membrane. Pulp exposures were created in rat teeth by use of a 1/4 bur followed by a sterile explorer. After capping, the area was covered with a Teflon disc and the access sealed with amalgam. Dycal, unimpregnated membrane, and no medication were used as controls. The rats were killed after 14 and 21 d and the samples processed histologically.

Results: No statistically significant difference in soft and hard tissue responses was revealed among the treatment groups after 14 d. Tertiary dentin of variable quality and quantity was apparent. After 21d, TGF- β_1 samples showed improved repair when compared with the controls (abundant short reparative dentinal tubules in contrast to inflammation and a fibrous tissue barrier).

CC: TGF- β_1 as a pulp-capping medication enhances reparative dentin formation in rat molars.

November 1998

Maria Santos

Berry KA, Loushine RJ, Primack PD, Runyan DA. Nickel-titanium versus stainless-steel finger spreaders in curved canal. J Endodon 1998;24:752-4.

PURPOSE: To compare the differences in the penetration depths of nickel-titanium (Ni-Ti) and stainless-steel (SS) finger spreaders in curved canals.

M&M: 70 mandibular molar canals with root curvatures of 0-51° were instrumented with a crown-down/balanced force technique to a MAF of 35. The teeth were placed in a radiographic mount to maintain a constant position and focal length. A size fine-medium NiTi and a size 20 SS finger spreader (comparable sizes) were inserted into canals until they met with firm resistance to advancement. Radiographs were exposed with the spreaders in place and the distance from the apex of each root to the tip of the spreader was measured.

RESULTS: The mean values for distance from the apex was 1.15 mm (± 0.28 mm) for the NiTi spreader and 2.4 mm (± 1.43 mm) for the SS spreader. The difference was statistically significant. Evaluating the linear regression for SS spreaders indicated an increase in the distance from the apex to spreader tip as canal curvatures increased; whereas for NiTi spreaders, the ability to approach the apex was not affected by an increase in root canal curvature.

C&C: NiTi may help us in our quest to get spreader deep (Allison, Michelich, Walton) in curved canals. Hopefully the accessory cone can follow this path to the same depth.

November 1998

John M. Yaccino

Waldman HB. Changing number and distribution of endodontists: A continuing imbalance - 1987-1995. J Endodon 1998;24:755-9.

Summary: Between 1987 and 1995, there was a total increase of 702 professionally active endodontists - a 31% increase in private and 8% increase in nonprivate practice. The annual number of graduates have increased from 123 in 1987 to approximately 160 in 1995. About 20% of the graduates of endodontic programs between the mid-1980s and mid-1990s were not citizens of the US. The national endodontic-to-population ratio increased from 0.9 to 1.1 endodontists per 100,000 persons. The states with the greatest number of endodontists in 1995 were California (423), New York (300), and Florida (190). The states with the smallest number include Wyoming (1), North Dakota (3), Montana, South Dakota, and Vermont (4 each).

November 1998

Maria Santos

Knowles KI, Ibarrola JL, Ludlow MO, Anderson JR, Newcomb BE. Rubber latex allergy and the endodontic patient. J Endodon 1998;24:760-2.

SUMMARY: Case presented where a 33 yof registered nurse with an extensive hx of allergic reactions to natural rubber latex products. Prior contact with latex had resulted in pruritus, urticaria, bronchospasms, and anaphylaxis (29 prior episodes). She required endodontic treatment of #3. After consulting the patient's physician, the patient was premedicated with prednisone, Benadryl, and Claritin before each treatment appointment. Vinyl examination gloves and a nonlatex rubber dam was used. Obturation was with gutta-percha and sealer using lateral condensation without incident. The patient did fine during the endodontic treatment, but while being seen by her general dentist for crown fabrication, she came into contact with a rubber handgrip device on a dental instrument and immediately experienced an anaphylactic reaction. 3 injections of 0.30 mg of epinephrine, 125 mg of Solumedrol, 50 mg of Benadryl IM, and 2 Proventil aerosol treatments were required.

C&C: Nonlatex materials and barriers should be available in every dental office. For some severely hypersensitive individuals, direct contact with natural rubber latex (NRL) is not necessary to invoke an allergic reaction. Phosphated cornstarch (used to prevent latex gloves from sticking together) can act as a vehicle for airborne transport of the latex allergen. NRL-sensitive patients should be scheduled first in the morning, before latex dust has accumulated in the office. The use of gutta-percha as an obturation material performed on NRL-sensitive patients requires extreme caution. Vertical condensation might not be too wise in this situation.

November 1998

John M. Yaccino

Dalton BC, Ørstavik D, Phillips C, Pettiette M, Trope M. Bacterial reduction with nickel-titanium rotary instrumentation. J Endodon 1998;24:763-7.

Purpose: To compare intracanal bacterial reduction with a NiTi rotary instrumentation technique to standard step-back technique using stainless-steel hand K-files.

M&M: Nonvital mature mandibular 1st and 2nd molars and single canal mandibular premolars with apical lesions were used. One group of patients received instrumentation using .04 Profiles while the 2nd group received hand instrumentation using SS K-files. Saline was used as an irrigant. The canals were sampled before, during, and after instrumentation.

Results: No difference was detected in the pattern of bacterial reduction with progressive filing between the 2 groups.

CC: Progressive instrumentation, whether it be by Profiles or hand files reduces intracanal bacteria.

November 1998

Maria Santos

Sluyk SR, Moon PC, Hartwell GR. Evaluation of setting properties and retention characteristics of mineral trioxide aggregate when used as a furcation perforation repair material. J Endodon 1998;24:768-71.

PURPOSE: To evaluate the effect of time and moisture on the setting, retention, and readaptation characteristics of MTA when used to repair furcation perforations.

M&M: Furcation perforations were made with a #2 round bur in 32 extracted maxillary and mandibular molars. Moistened Gelfoam was used as a matrix material. MTA was placed into the perforation. Teeth were divided into 4 groups. Setting characteristics were varied by placing a wet or dry cotton pellet in contact with the MTA for 24 or 72 h. Instron testing was used to measure the force required to displace the MTA from the perforation.

RESULTS: Force measurements showed that the MTA resisted displacement at 72 h to a significantly greater level than at 24 h. The presence of some moisture in the perforation during placement was advantageous in aiding adaptation of the MTA to the walls of the perforation, but there was no significant difference in MTA retention when a wet or dry cotton was placed in the pulp chamber during the setting time.

C&C: Results support placing a cotton pellet and temporary restoration over MTA for 72 h to encourage setting. Use of a moistened matrix material before placement of the MTA is also recommended.

November 1998

John M. Yaccino

December

Folwaczny M, Liesenhoff T, Lehn N, Horch HH. Bactericidal action of 308 nm excimer-laser radiation: An in vitro investigation. J Endodon 1998;24:781-5.

Purpose: To investigate whether a 308 nm excimer-laser radiation has antimicrobial effects.

M&M: Six different bacteria (*S. aureus*, *E. coli*, *Salmonella typhimurium*, *S. faecalis*, *Lactococcus lactis*, and *Deinococcus radiodurans*) were incubated and put into microtiter plates. The optical fiber was fixed at a constant distance from the surface of the single samples and the focus of the beam was adjusted to the center of the specimen. Samples were exposed to various doses and energy densities of laser radiation. The temperature rise in each sample was measured. After irradiation, the number of colony forming units remaining was counted. Other specimens were irradiated for various durations to determine the dependency of antimicrobial effects on the radiation time.

Results: Temperature rise depended on the energy density of the laser beam. A plateau was reached after exposure of the specimen to 4000 laser pulses. The average temperature change after 4000 pulses was 4.5°C and average rise was 16.3°C. There was a rapid decline in viable microorganisms with smaller pulse numbers. The killing rate was lowest for *D. radiodurans* and strongest for *S. faecalis*. The mean number of laser pulses killing 90% of the microorganisms ranged from 93 pulses for *E. coli* to 1107 pulses for *D. radiodurans*. Bacterial reduction was observed in all investigated interval of energy densities, even below ablation threshold for human tissue.

CC: 308 nm excimer-laser radiation causes very intensive antimicrobial effects. The degree of bacterial reduction depends on time and energy density of radiation and the irradiated strain of bacteria. Reduction of bacterial growth is independent of temperature.

December 1998

Maria Santos

Horn DJ, Bulan-Brady J, Hicks L. Sphere spectrophotometer versus human evaluation of tooth shade. J Endodon 1998;24:786-90.

PURPOSE: To compare an objective to a subjective method of tooth shade evaluation.

M&M: 20 extracted human anterior teeth with no caries or restorations had their lightness values recorded by a SP78 sphere spectrophotometer at two different times 2 wks apart. 5 evaluators attempted to match the teeth to a six-tab shade guide at the two different times.

RESULTS: The sphere spectrophotometer was able to produce an 80% agreement with itself over time. In contrast, the 5 evaluators were only able to achieve a 45% intraevaluator agreement average.

C&C: The sphere spectrophotometer appears reliable for use in evaluating tooth shade *in vitro* and may be useful in testing the effectiveness of different bleaching techniques (see next article).

December 1998

John M. Yaccino

Horn DJ, Hicks ML, Bulan-Brady J. Effect of smear layer removal on bleaching of human teeth in vitro. J Endodon 1998;24:791-5.

Purpose: To evaluate in vitro with the SP78 sphere spectrophotometer the effectiveness of bleaching discolored teeth with or without the smear layer present using sodium perborate mixed with sterile water or 35% H₂O₂.

M&M: 70 extracted anterior teeth were used. After a base line shade was calculated by the SP78, the smear layer was removed intracoronally and the teeth were artificially stained (submerged in expired human hemoglobin then centrifuged). An intracoronally smear was created in all teeth by using a #4 round bur. Shade values were again calculated. The smear layer was removed in ½ of the experimental teeth. All of the teeth were bleached intracoronally with sodium perborate and 35% H₂O₂ or sodium perborate and water. The bleaching materials were replaced after 4 d. After another 4 d, the shade values were calculated.

Results: The removal of the smear layer did not significantly affect the effectiveness of bleaching. Sodium perborate and 35% H₂O₂ was significantly better in removing intracoronally stains.

CC: Smear layer removal does not enhance the results of intracoronally bleaching.

December 1998

Maria Santos

Pumarola-Suñé J, Solá-Vicens L, Sentís-Vilalta J, Canalda-Sahli C, Brau-Aguadé E. Absorbency properties of different brands of standardized endodontic paper points. J Endodon 1998;24:796-8.

PURPOSE: To compare the absorbency properties of different brands of standardized endodontic paper points available on the market.

M&M: Size 30 paper points from 12 different manufacturers were weighed, placed in distilled water for 5 seconds and reweighed to determine the amount of fluid absorbed.

RESULTS: Three brands of standardized paper points showed significantly higher absorbencies than the other brands.

C&C: Reminds me of a Bounty paper towel commercial. Not too clinically relevant.

December 1998

John M. Yaccino

Forte SG, Hauser MJ, Hahn C, Hartwell GR. Microleakage of Super-EBA with and without finishing as determined by the fluid filtration method. J Endodon 1998;24:799-801.

Purpose: To evaluate the microleakage of SuperEBA with and without the use of a finishing bur and to determine the relationship between microleakage and time using the fluid filtration method.

M&M: 65 single-rooted teeth were accessed and prepared to a #60. 2 mm of the apex was resected perpendicular to the long axis of the tooth. The root canal was obturated with a #60 master cone without sealer and the excess GP at the apex was removed with a blade. After root-end preparation with an ultrasonic handpiece (3-mm depth), the preparations were filled with SuperEBA. 24 roots were finished with a 30-fluted finishing bur in a highspeed handpiece using water spray. 26 roots were cold-burnished with a ball burnisher before setting. Immediately after setting, the GP fill was removed and the teeth were prepared for the microleakage study. Each sample was measured at time intervals of 24h, 1wk, 1mo, 3mo, and 6mo.

Results: The finished group had higher leakage values initially (significant only at 24h) but with time, the values decreased. The differences in leakage were not significant at any other time period.

December 1998

Maria Santos

Cohen BI, Deutsch AS, Musikant BL, Pagnillo MK. Effect of power settings versus temperature change at the root surface when using multiple fiber sizes with a Holmium YAG Laser while enlarging a root canal. J Endodon 1998;24:802-6.

PURPOSE: To determine if there is a large enough increase in temperature at the cementum surface to jeopardize the health of the surrounding tissues when lasing with a Ho:YAG laser using three power settings and four fiberoptic sizes.

M&M: 60 extracted single-rooted teeth were decoronated and instrumented to the apex to a #15 file and divided into 3 groups to receive different laser power settings (0.50, 0.75, and 1.00 W). Microprocessor thermometers with thermocouplers were applied near the CEJ and near the apical end. Each tooth was subjected to lasing using fiber sizes of 140, 245, 355, and 410 μm . The cutting energy was in the shape of a donut, with no energy in the hole (the lateral walls of the canal were lased, not the apical area). After lasing, endodontic files were inserted into the canal as far as they would go to determine the amount that each canal diameter was enlarged by the laser energy.

RESULTS: 98% of the temperature change was between 0° and 5°C which is thought to be biologically safe. Different power settings didn't affect temperature change. For the depth of tooth during lasing (how far the fiberoptic guide penetrated the tooth), no interaction between fibers and power settings was observed. Depth decreased as fiber size increased.

C&C: How would this laser work in curved and calcified canals? Only the 140 μm fiberoptic guide could be placed to 10 mm (WL?). Would this apical preparation size be little small?

December 1998

John M. Yaccino

Dean JP, Jeansonne BG, Sarkar N. In vitro evaluation of a carbon fiber post. J Endodon 1998;24:807-10.

Purpose: To evaluate the influence of endodontic and restorative procedures on fracture resistance of teeth and to compare the incidence of root fracture among teeth restored with 3 different types of posts, each supporting a composite core build-up.

M&M: 60 extracted canines were prepared endodontically while 10 were not. After filling with GP and AH26, the teeth were divided into 6 treatment groups. All were subjected to a 45° load until failure occurred.

1. controls - no endo, no restoration
2. endo, no post, GP in access
3. endo, no post, cmpst in access
4. endo, C-post, cmpst in access
5. endo C-post, composite core
6. endo, tapered SS post, cmpst core
7. endo, parallel SS post, cmpst core

Results: Fracture resistance was highest in the control group and lowest in the C-post/core group. Groups with intact crowns were significantly more fracture-resistant than groups with crowns removed and restored with a post and cmpst core. No significant difference was noted among the 4 groups with intact crowns or among the 3 groups with crowns removed. The groups with SS posts demonstrated a 50% incidence of root fracture while the C-post/core group had no root fracture.

CC: The authors admit specimens to include cast crowns would be more relevant.

December 1998

Maria Santos

Matsumoto A, Anan H, Maeda K. An immunohistochemical study of the behavior of cells expressing interleukin-1 α and interleukin-1 β within experimentally induced periapical lesions in rats. J Endodon 1998;24:811-6.

PURPOSE: To define the exact relationship between IL-1 expressing cells and bone remodeling in rat periapical lesions by means of immunohistochemical and histometric techniques.

M&M: Experimental apical periodontitis was produced in rats by opening the pulp chambers, filing a canal, and leaving the teeth open. Rats were killed at 3, 7, 14, and 28 days after treatment. In another experiment, either formocresol or saline were placed in the apical portions of canals after 14 days.

RESULTS: Both IL-1 α and IL-1 β were mainly expressed by macrophages. During the acute phase (day 3-14), the number of IL-1 β -expressing macrophages was about double that of IL-1 α -expressing macrophages. This seemed to be the activation phase of bone resorption in these experimentally induced periapical lesions. At day 28, the increase in the area of the periapical lesion ceased (chronic phase) and was associated with a decrease in the number of IL-1 β -expressing cells. The placement of formocresol resulted in increased area of periapical lesions and again an increase in macrophages expressing IL-1 β .

C&C: Blocking IL-1 activity may provide a therapeutic benefit. In cases where a periapical lesion has difficulty in subsiding due to severe inflammation, it is possible that healing mechanisms could be activated by a suppression of IL-1 β production and its secretion, using a combination of antibacterial agents and IL-1 β inhibitors.

December 1998

John M. Yaccino

Matsushita K, Tajima T, Tomita K, Abeyama K, Maruyama I, Takada H, Nagaoka S. Inflammatory cytokine production and specific antibody responses against possible causative bacteria in patients with multilesional periapical periodontitis. J Endodon 1998;24:817-21.

Purpose: To investigate the immune responses against oral and reference bacterial species of patients with periapical periodontitis with differing symptoms and different numbers of periapical lesions.

M&M: Seven strains of oral bacteria implicated in periapical periodontitis were cultured, washed, and lyophilized. Sera was collected from blood samples of 16 patients (4 with 10 or more lesions, 6 with 1 or 2, and 6 with no lesions). Heparinized blood was also collected from 2 patients in each group. This blood was directly incubated with test specimens. IL-1 activity was determined. The concentrations of various cytokines in test sera and those in test supernatants were determined by ELISA kits. Serum and saliva samples were collected from 6 subjects (2 from each group). The serum IgG and salivary IgA titer against bacterial cells were determined.

Results: Almost all cytokines except TNF- α and GM-CSF were undetectable in sera. TNF- α and GM-CSF were detected in a serum sample from one patient in the high lesion group. IL-1 was induced in all the whole blood cultures stimulated with bacterial whole cells. The concentration increased in a dose-dependent manner. IL-1 β was also induced in all of the whole blood cultures, especially with *P. intermedia*, *F. nucleatum*, and *E. coli*. However, a clear correlation was not established with IL-1 β and the number of periapical lesions. All bacterial species tested induced TNF- α and G- bacteria induced TNF- α more strongly than G+ bacteria. Induction of PGE₂ was similar to TNF- α . No difference was observed in the concentrations of TNF- α or PGE₂ in the 3 groups. *P. intermedia* and *P. gingivalis* strongly induced IL-8; no correlation was observed with the number of lesions. IL-6 was significantly induced by *P. melaninogenica* in cultures from 2 patients from the high lesion group. There was a definite IgG response against bacterial cells in all serum samples. High levels of IgA against *P. gingivalis* were observed in sera from 2 patients in the high lesion group.

CC: A correlation exists between inflammatory cytokine responses in vitro against specific periapical periodontitis-associated bacteria and periapical periodontitis disease activity expressed as the number of periapical lesions. *P. melaninogenica* and *P. gingivalis* may be involved in multilesional periapical periodontitis by inducing specific cytokines and/or humoral immune responses.

December 1998

Maria Santos

Bunczak-Reeh MA, Hargreaves KM. Effect of inflammation on the delivery of drugs to dental pulp. J Endodon 1998;24:822-5.

PURPOSE: To evaluate whether pulpal exposure/inflammation alters the delivery of drugs to the dental pulp.

INTRO: Plasma extravasation is the outflow of fluid and plasma proteins into the inflamed extracellular compartment. Agents that are bound to plasma proteins are likely to exhibit increased delivery into inflamed tissues by the process of plasma extravasation. Most NSAIDs, including flurbiprofen are >99% bound to plasma protein; only ~0.1% is in the free state and biologically active.

M&M: Pulp were exposed in rats and either Evan's blue, flurbiprofen (both heavily bound to plasma proteins), or vehicle were injected intravenously. To evaluate the neurogenic component of plasma extravasation, rats were injected with capsaicin or vehicle. The effect of pH alterations as occurs in inflamed tissue on the concentrations of flurbiprofen was also evaluated.

RESULTS: Pulpal inflammation altered the delivery of both agents to inflamed molars. Activation of capsaicin-sensitive nerves increased the pulpal content of protein-bound agents. Reduced pH increased free drug concentrations of flurbiprofen.

C&C: Alterations in both plasma extravasation and tissue pH seem to be relevant factors regulating the delivery and bioavailability of flurbiprofen to dental pulp. Excellent study.

December 1998

John M. Yaccino

Parente SA, Anderson RW, Herman WW, Kimbrough WF, Weller RN. Anesthetic efficacy of the supplemental intraosseous injection for teeth with irreversible pulpitis. J Endodon 1998;24:826-8.

Purpose: To determine the effectiveness of the intraosseous injection (IOI) of 2% lidocaine with 1:100k epi, using the Stabident device as a supplemental technique for pulpalgia refractory to conventional methods of local anesthesia during endodontic treatment.

M&M: 37 patients with irreversible pulpitis were used. All had received at least 3.6 ml of local anesthetic delivered in a conventional manner but were still sensitive to access or instrumentation. The Stabident was used to deliver 0.45 to 0.9 ml of more local anesthesia. A visual analogue scale was complete by each patient.

Results: The Stabident was an effective supplemental anesthetic technique for endodontic treatment in 89%.

CC: *Nothing new.*

December 1998

Maria Santos

Molen CK, Begole EA, Jacobsen EL. Endodontic patient recall procedures: a national survey of endodontic practices. J Endodon 1998;24:829-32.

PURPOSE: To determine the design and extent of recall procedures among practicing endodontists.

M&M: A random sample of 300 endodontists from an AAE membership of 3003 were mailed surveys.

RESULTS: 243/300 responses were received. 9/50 diplomates and 20/180 nondiplomates did not indicate having a recall system. The military typically did not have a recall system (4/10 surveyed). Many of the respondents indicated a 95-100% success rate, even if they do not maintain a recall system. In instances where the initial treatment was done by someone else, conventional (NSRCT) retreatment was the preferred option. In our own treatment failures, the respondent frequently stated that surgical intervention was the preferred option.

C&C: Recall programs are a necessity (though not always practical for the military endodontist).

December 1998

John M. Yaccino

Eleazer PD, Eleazer KR. Air pressures developed beyond the apex from drying root canals with pressurized air. J Endodon 1998;24:833-6.

Purpose: To determine air pressures developed in the periapical region during endodontic treatment using high- and low-pressure air syringes.

M&M: 10 extracted molars were access and instrumented with Profiles and K-files. Pressure readings were recorded while drying with a 3-way syringe or a Stropko air syringe. The standard tip was kept above the level of the coronal access opening while the Stropko tip was used just coronal to the canal orifice. Apex diameter, orifice diameter, and canal lengths were also recorded. Five additional molars were access and instrumented. Pressures were recorded after each instrument. Pig jaws were obtained and 2 immature teeth were opened and instrumented. A slurry of barium sulfate and water was placed into the canals. The canals were exposed to pressurized air from a 3-way syringe. Radiographs were taken to determine the presence of barium sulfate beyond the root.

Results: Apical pressures ranged from 0-26 mmHg from the Stropko and 0-240 mmHg from the standard syringe. In the 2nd part of the study, all canals showed a steep rise in apical pressure at file size 25 with the standard air syringe (#15: 0-25, #20: 0-39, #25: 22-150). A plateau was reached at size 30 or larger. No differences were seen in longer roots. The pig experiment showed no evidence of air emphysema.

CC: Avoid compressed air-drying of all root canals.

December 1998

Maria Santos

Barbat J, Messer HH. Detectability of artificial periapical lesions using direct digital and conventional radiography. J Endodon 1998;24:837-42.

PURPOSE: To compare the diagnostic capabilities of conventional radiographs and direct digital images in detecting simulated apical radiolucencies, based on replicating the features of a periapical lesion in human mandibles.

M&M: 8 hemisected mandibular cadaver specimens were used. Soft tissue was removed and the specimens were split into buccal and lingual sections which could be reassembled. Lesions were created around the distal roots of 1st molars and mesial roots of 2nd molars. Radiographs were taken of the specimens which were mounted in a device that assured uniform orientation at four stages: 1) preoperative, 2) after removal of the lamina dura, 3) after lesion creation in cancellous bone, and 4) after cortical plate involvement. Digora images were made using three image

configurations: gray scale, reverse image, and color intensity mapping. Radiographs and Digora images were evaluated by eight endodontists or grad students as to whether a lesion was 1) definitely present, 2) probably present, 3) possibly present, 4) probably not present, or 5) definitely not present.

RESULTS: Substantial variation was found in the interpretation of radiographic images; the observers agreed with each other 53% of the time for conventional radiographs, 59% for gray scale, 47% for color, and 32% of the time for reverse images. There was wide variation in interpretation for the preoperative stage. Removal of the lamina dura was the most significant step in radiographic detectability. Removal of cancellous bone did not lead to major changes in detectability for any image type. Cortical plate involvement led to very high scores (lesion definitely present) regardless of image type. There was a tendency for 1st molars to be scored more accurately than the 2nd molars.

C&C: No significant differences between radiographs and gray scale Digora images were found for any lesional state. The preoperative intact state was significantly more accurately identified using color and reverse images, whereas after lesion creation, gray scale and radiographs detected lesions significantly more often. Although radiographic images provide valuable diagnostic information, to some extent it is empirical information that is prone to subjective interpretation.
Who's reading the radiograph?

December 1998

John M. Yaccino

Mize SB, Clement DJ, Pruett JP, Carnes DL. Effect of sterilization on cyclic fatigue of rotary nickel-titanium endodontic instruments. J Endodon 1998;24:843-8.

Purpose: To determine the effect of heat treatment resulting from autoclave sterilization procedures on the cyclic fatigue properties of rotary Ni-Ti endodontic instruments.

M&M: #40 Lightspeed instruments were cycled in artificial canals to either 25, 50, or 75% of the mean cycles-to-failure limit then sterilized or not sterilized before being cycled to failure. Another set of instruments were cycled to 25% of the mean cycles-to-failure then sterilized or not sterilized. This was repeated until the instruments failed.

Results: The differences in cycles to failure between presterilized or nonsterilized instruments were not significant.

CC: Heat treatment as a result of autoclave sterilization does not extend the useful life of nickel-titanium instruments.

December 1998
Santos

Maria



ARTICLES OF ENDODONTIC INTEREST FROM OTHER JOURNALS

Imura N, Otani SM, Campos MJA, Jardim EG, Zuolo ML. Bacterial penetration through temporary restorative materials in root-canal-treated teeth in vitro. Int Endo J 1997;30:381-5.

PURPOSE: To determine the length of time taken by bacteria present in natural human saliva to penetrate through three commonly used temporary restorative materials and through the entire root canal system obturated by lateral condensation of cold gutta-percha in an in vitro model.

M&M: Seventy single-rooted teeth were cleaned and shaped and obturated with a ZnO-eugenol sealer and laterally condensed gutta-percha. All access preparations were refined to at least 3.5 mm in depth. Group 1 had 20 teeth restored with gutta-percha stopping. Group 2 teeth had 20 teeth restored with IRM. Group 3 teeth were restored with Cavit-G. The teeth were stored in a humidifier for 1 w to allow the sealer and temporary restorative materials to set completely. Ten teeth were used as positive and negative control groups. Teeth with no decay were negative controls and teeth with extensive decay in communication with the pulp canal were positive controls. The teeth were suspended and sealed in tapered tubes with cyanoacrylate and resin. The plastic tube was inserted into a sterilized glass tube containing brain heart infusion broth. Saliva was collected and placed into a plastic tube and changed after 20, 40, 80 min, 2, 24 h and every 24 h thereafter. The number of days it took for the broth of each sample to become turbid was recorded.

RESULTS: All five teeth in the positive control group caused broth turbidity within 24 h. Group 1 took from 2 - 15 d with average of 7.85 d; group 2 2 - 22 d with average of 12.95 d; group 3 2 - 19 d with average of 9.8 d.

C&C: Gutta-percha leaked quicker than IRM. Cavit and IRM groups weren't significantly different.

January 1998

Rodney M. Waite

McRobert AS, Lumley PJ. An in vitro investigation of coronal leakage with three gutta-percha backfilling techniques. Int Endodon J 1997;30:423-7.

Purpose: To evaluate three different methods of backfilling; the System B, Obtura II and Alphaseal.

M&M: 46 single rooted lower premolars were similarly prepared using the ProFile NiTi instruments, then divided into four experimental obturation groups. Group 1 was obturated using lateral condensation only. The other three groups were obturated in the apical third using the System B, then backfilled using either the System B, Obtura II, or Alphaseal. Controls were also used. The roots were radiographed in the proximal view to determine the density of each fill. The roots were then placed in India ink for 65 hrs. Longitudinal leakage was evaluated after the roots were cleared.

Results: Each of the four groups showed no significant difference in regard to radiographic density or voids. System B and Obtura II leaked significantly less than

the lateral condensation and Alphaseal. Alphaseal proved to be unpredictable, producing the most voids and leakage.

C&C: The two groups that involved vertical condensation at the end of obturation produce less leakage and the authors recommend that this procedure be adopted as a routine.

January 1997

Michael J. Mauger

Imura N, Otani SM, Campos MJA, Jardim EG, Zuolo ML. Bacterial penetration through temporary restorative materials in root-canal-treated teeth in vitro. Int Endo J 1997;30:381-5.

PURPOSE: To determine the length of time taken by bacteria present in natural human saliva to penetrate through three commonly used temporary restorative materials and through the entire root canal system obturated by lateral condensation of cold gutta-percha in an in vitro model.

M&M: Seventy single-rooted teeth were cleaned and shaped and obturated with a ZnO-eugenol sealer and laterally condensed gutta-percha. All access preparations were refined to at least 3.5 mm in depth. Group 1 had 20 teeth restored with gutta-percha stopping. Group 2 teeth had 20 teeth restored with IRM. Group 3 teeth were restored with Cavit-G. The teeth were stored in a humidifier for 1 w to allow the sealer and temporary restorative materials to set completely. Ten teeth were used as positive and negative control groups. Teeth with no decay were negative controls and teeth with extensive decay in communication with the pulp canal were positive controls. The teeth were suspended and sealed in tapered tubes with cyanoacrylate and resin. The plastic tube was inserted into a sterilized glass tube containing brain heart infusion broth. Saliva was collected and placed into a plastic tube and changed after 20, 40, 80 min, 2, 24 h and every 24 h thereafter. The number of days it took for the broth of each sample to become turbid was recorded.

RESULTS: All five teeth in the positive control group caused broth turbidity within 24 h. Group 1 took from 2 - 15 d with average of 7.85 d; group 2 2 - 22 d with average of 12.95 d; group 3 2 - 19 d with average of 9.8 d.

C&C: Gutta-percha leaked quicker than IRM. Cavit and IRM groups weren't significantly different.

January 1998

Rodney M. Waite

Molander A, Reit C, Dahlen G, Kvist T. Microbiological status of root-filled teeth with apical periodontitis. Int Endo J 1998;31:1-7.

Purpose: To investigate the composition of the microbiota in failing root canal treatments.

M&M: 100 teeth which had root canal therapy at least 4 years previously and presented with a radiographic lesion and 20 teeth with no sign of apical pathosis were retreated endodontically. After the GP was removed, the canals were cultured for anaerobic and aerobic bacteria.

Results: The presence of an intracanal microbiota was demonstrated in 68 of the 100 teeth examined in the pathosis category from which 117 strains were recovered. From most of the canals one or two strains were isolated (85%). There was a predominance of gram positive facultative anaerobes (69%). The most frequently isolated species belonged to the *Enterococcus* group. In 20 of these cases growth was classed as very heavy. 13 strains were isolated from nine of the 20 teeth examined in the retreat for technical inadequacies group. 8 of the strains showed sparse growth.

C&C: In 21 cases where chloroform was used to dissolve the GP, bacterial growth was significantly less frequently demonstrated, suggesting that chloroform toxicity may deprive microbes of their capacity to reproduce.

March 1998

Michael J. Mauger

Harashima T, Takeda FH, Zhang C, Kimura Y, Matsumoto K. Effect of argon laser irradiation on instrumented root canal walls. Endod Dent Traumatol 1998;14:26-30.

PURPOSE: To evaluate the effect of argon laser irradiation on the debridement of endodontically instrumented root canals.

M & M: Twelve extracted max molars had their crowns sectioned and the canals instrumented by step-back to a #50 K-file. 5.25% NaOCl and 3% H₂O₂ were used alternately as irrigant. Control teeth were not lased. Lased teeth were irradiated with an argon laser optical fiber which was introduced to WL and activated during withdrawal strokes for 4 exposures of 15 s duration. The roots were split, observed with the SEM and the cleansing effect evaluated.

RESULTS: A thick smear layer and debris was present in the unlased group and only 1/18 teeth had a clean root canal wall. The teeth in the lased group showed melted dentin surfaces and vaporized debris. Thirteen specimens presented clean root canals.

C & C: These benchtop studies sure make the laser look good. Too bad most of the clinical studies don't.

March 1998

Rodney M. Waite

Kavanagh D, Lumley PJ. An in vitro evaluation of canal preparation using ProFile .04 and .06 taper instruments. Endo and Dent Traumatol 1998;14:16-20.

Purpose: To evaluate the addition of orifice openers and .06 taper files to the .04 taper technique with respect to maintaining original canal path, canal shaping and instrumentation time in moderately to severely curved root canals.

M&M: 30 MB roots of Maxillary molars with curvature of 42 degrees and mean radius of curvature of 4.8mm were used. The crowns were removed so that total canal working length was 19mm. The teeth were randomly divided into three groups. Group 1 canals were instrumented with ProFile .04 taper Series 29. Group 2 were instrumented with orifice openers., ProFile .04 taper and followed by the same size .06 tapered . Group 3 canals were instrumented using Gates Glidden burs and .02 taper Profile hand instruments. The canals were evaluated for maintaining original canal path and shaping from their pre and post instrumentation radiographs. The root was in the same plane of orientation for each radiograph.

Results: There was no significant difference between the techniques in canal transportation in all areas of the root. The .06 taper group was easier to place a D11T spreader. Group 1 was quicker in canal preparation.

C&C: Two rotary files fractured in the 20 canals prepared using rotary .04 tapers; this represented a high incidence of instrument failure.

March 1998

Michael J. Mauger

De Rossi SS, Glick M. Lupus erythematosus: considerations for dentistry. JADA 1998;129:330-9.

PURPOSE: To describe considerations for managing dental treatment of patients with LE.

SUMMARY: LE is a collagen vascular, or connective tissue disease which affects >1.5 million people in the US. Patients are at increased risk of experiencing bleeding, infection, endocarditis, adrenal insufficiency, and mucocutaneous disease. Systemic Lupus Erythematosus (SLE) is characterized by autoantibodies and immune complexes. Ninety percent of those affected are young to middle aged women. The 20 y survival rate is 70%. The classifications of LE are: SLE, bullous form, neonatal form, chronic cutaneous (CCLE), subacute cutaneous (SCLE) and drug-related lupus. CCLE and SCLE are primarily dermatologic, consisting of round, erythematous plaques with hyperpigmented margins. Apart from the skin, the kidney is the organ most commonly affected, and patients progress to end stage renal disease.

Routine dental treatment: if previous steroid use > 2 w and ceased < 14-30 d, give maintenance dose; if ceased > 30 d, no supplementation needed; if currently taking steroids, no supplementation. Extractions, surgery: same treatment except double daily dose on surgery day and first post-op day if currently taking steroids.

Dental management: renal disease - treat on non-dialysis days; drug metabolism may be altered; immunosuppressive therapy - glucocorticoid therapy can cause adrenal suppression for up to one year. However, the patient's stress response usually returns within 14 to 30 d. Use short morning appointments, long-acting anesthetics, post op analgesics and consider premedication. Cardiac - antimicrobial prophylaxis in patients with valvular pathosis. Hematologic - thrombocytopenia is one of the most prevalent hematologic abnormalities and patients may be at increased risk of bleeding following surgical procedures. Block injections should be avoided if platelet count is <20,000; use infiltration and intraligamentary injections, avoid NSAIDs.

Mucocutaneous - central, eroded, red atrophic area surrounded by a thin elevated keratotic margin that runs into small white lines.

March 1998

Rodney M. Waite

Elliott LM, Curtis RV, Pitt Ford TR. Cutting pattern of nickel-titanium files using two preparation techniques. Endod Dent Traumatol 1998;14:10-15.

PURPOSE: To compare the difference in cutting characteristics between NiTi and ss files of similar design and geometry and produced by the same manufacturer, in both stepback and balanced-force techniques using simulated canals in resin blocks.

M & M: One hundred plastic blocks with 40° curvatures were used. Preoperative images of the canal were made and stored in the computer. Group 1 consisted of Nitiflex file used with the balanced-force technique to an apical size of 40; group 2 -

Flexofile w/balanced force; group 3 consisted of Nitiflex used with a stepback, circumferentially filed method to an apical size of 30; group 4 - Flexofile w/step back/circumferentially file technique. After preparation, an image of the post-instrumentation canal was made and superimposed on the pre-instrumentation image and the amount of material removed during instrumentation reported.

RESULTS: Nitiflex files using the balanced-force technique remained more centered in the canal than the Flexofile. The Nitiflex files using the step-back technique transported the canal more apically.

C & C: The NiTi files with step-back removed more material apically, which may have been due to the greater restoring force of the NiTi file on the outer curve. NiTi files used with the balanced-force technique resulted in a more centered preparation than with a step-back technique.

March 1998

Rodney M. Waite

Moiseiwitsch JRD. Position of the mental foramen in a North American, white population. 000 1998;85:457-60.

PURPOSE: To investigate the position of the mental foramen in a sample of cadavers for whom the demographics were available.

M&M: One hundred mental foramina were assessed for its horizontal relationship to the facial cusp of the nearest tooth. The vertical relationship was measured in mm from the superior border of the foramen to the CEJ of the nearest tooth.

RESULTS: 41% fell between the pms, 18% below the second pm, and 31% between the second pm and first molar. The vertical position was 16 mm, with a range of 8 to 21 mm.

C&C: Only 10% of the foramina were present in unusual positions, either aligned with the first pm or first molar. 90% of the foramina are between the pms and first molar. This sample was from a population that we may be treating.

May 1998

Rodney M. Waite

Nair PNR. New perspectives on radicular cysts: do they heal? Int Endod J 1998;31:155-60.

SUMMARY: The incidence of cysts among apical periodontitis lesion varies from 6% to 55% according to the literature. Accurate histopathological diagnosis of radicular cysts is possible only through serial sectioning of the lesions removed *in toto*. This method was not done in Bhaskar's or Lalonde & Luebke's studies. When the histopathological diagnosis is based on random or limited number of serial sections, most epithelialized periapical lesions would be wrongly classified as radicular cysts. In a 1996 study of 256 lesions in which an overall 52% of the lesions were found to be epithelialized but only 15% were actually periapical cysts. Of this 15%, 9% were apical true cysts and 6% were periapical pocket (bay) cysts.

Because of the 85-90% success rate of nonsurgical endodontic therapy and the previously high incidence (>40%) of apical lesions believed to be cysts, it was thought that most of the cystic lesions must heal in order to account for this high success rate. The tissue dynamic of a true cyst is self-sustaining and therefore less likely to be resolved by conventional RCT.

The low incidence of periapical cysts and the existence of two distinct classes of cystic lesions at the periapex call for a rethinking of the rationale behind some of the current diagnostic and therapeutic procedures currently practiced: 1) routine histopathological examination of periapical lesion removed by curettage; 2) (Oral surgeons) performing disproportionately large numbers of apical surgery based on radiographic diagnosis of a periapical lesion as a radicular cyst; 3) (Endodontists) notion that a large majority of cysts heal after nonsurgical RCT; 4) and the decision to retreat an asymptomatic, post-therapeutically persisting periapical lesion instead of adopting apical surgery as the treatment of choice under those clinical circumstances.

CC: Excellent article.

June 1998

John M. Yaccino

Sae-Lim V, Wang CY, Choi GW, Trope M. The effect of systemic tetracycline on resorption of dried replanted dogs' teeth. Endod Dent Traumatol 1998;14:127-32.

Purpose: To evaluate the effect of systemic tetracycline, compared to that of the systemic amoxicillin, on the periodontal healing of replanted dog's teeth.

M&M: Mature lateral incisors and 1st and 3rd premolars in 4 beagle dogs were used. All received prophylactic RCT on the experimental teeth to rule out possible inflammatory root resorption caused by pulpal infection. The teeth were extracted and bench dried for 60 min. Immediately after replantation and for the following 6 d, the dogs were given orally either 250-mg tetracycline tid or 250-mg amoxicillin bid. Control teeth were treated in the same manner except that no antibiotics were given. These were treated at an interval 4 weeks separated from the experimental to minimize the effects of the antibiotics. 12 – 16 weeks after replantation, the dogs were euthanized and block specimens were sectioned and stained. The appearance of the root surface (not root end) was evaluated and classified according to Andreasen as healed or showing the presence of replacement or inflammatory root resorption.

Results: Complete healing occurred with a mean occurrence of 35.45% in the tetracycline group, 10.90% in the amoxicillin group and 11.28% in the control group. However, since the results varied considerably in each group, there was no statistical difference. When individual teeth with over 50% complete healing sites were considered, significantly more of these were found in the tetracycline group (5/11) when compared to the amoxicillin group (1/11) or the control group (1/8).

CC: Tetracycline has been shown to have inhibitory effects on collagenase and osteoclastic activities. Since systemic penicillin has been recommended for oro-facial injuries, including replantation cases, for 4 – 7 d, tetracycline may be considered an alternative after an avulsion injury. Sounds feasible.

July 1998

Maria D. Santos

Holtzmann DJ, Johnson WT, Southard TE, Khademi JA, Chang PJ, Rivera EM. Storage-phosphor computed radiography versus film radiography in the detection of pathologic periradicular bone loss in cadavers. Oral Surg 1998;86:90-6.

PURPOSE: To compare D-speed film, E-speed film, and the Soredex Digora system with respect to the detection of periradicular pathosis.

M&M: Human jaws obtained from 28 cadavers were prepared and screened for periradicular resorptive lesions. A total of 100 teeth, 50 maxillary and 50 mandibular were used for the study; one third of these appeared to have periradicular radiolucencies. A jig was constructed for consistent orientation and imaging of the samples. Radiographs were made using D-speed and E-speed film and images were made using the Soredex Digora system (using a storage-phosphor sensor). The radiographs (at 2X magnification) and digital images were evaluated by four endodontists who indicated whether a lesion was 1) definitely absent, 2) probably absent, 3) possibly present, 4) probably present, or 5) definitely present. After viewing, the samples were prepared for histological exam and definitive diagnosis.

RESULTS: 19 of 96 samples (4 were lost during processing) contained true pathosis. All three imaging techniques were found to be equivalent; none was particularly accurate. Clinicians should perform complete diagnostic testing and thus avoid the risk of biasing themselves with radiographic images only - images that are not always accurate. A significant observation was made regarding overprediction or the identification of pathosis that was not in fact present; this was consistent among all four observers and in all imaging modes. There was poor agreement among the observers.

C&C: The Digora system was no better, no worse than the D and E-speed radiographs with 50% less radiation exposure to the patient. Who's reading the radiograph?

August 1998

John M. Yaccino

Moore PA. *Selecting drugs for the pregnant dental patient. J Amer Dent Assoc 1998;129:1281-6.*

Summary: Dental treatment for a pregnant woman who has oral pain, advanced disease or infection should not be delayed. The FDA has established 5 categories for classifying drugs according to the risks they pose to pregnant women and their fetuses. Categories A & B are appropriate for use during pregnancy; C are used with caution; D & X should be avoided.

A- drugs that have been studied in humans and have evidence supporting their safe use

B- drugs that show no evidence of risk in humans

C- drugs for which teratogenic risk cannot be ruled out

D- drugs that demonstrated risks in humans

X - agents that have been shown to be harmful to the mother or fetus

Local anesthetics - all can cross the placenta and can cause fetal depression; use the minimum for effective pain control. Epinephrine is not teratogenic but can stimulate cardiovascular function.

Peripherally acting analgesics - Acetaminophen is the best choice for oral-facial pain during pregnancy. Aspirin and NSAIDs should be avoided especially late in pregnancy. Aspirin has been associated with anemia during pregnancy and postpartum hemorrhage. NSAIDs may prolong pregnancy by blocking synthesis of the prostaglandins involved in induction of labor.

Centrally acting opioids - Codeine and propoxyphene are associated with multiple congenital defects.

Antibiotics - penicillin & cephalosporins are generally thought to be safe. Clindamycin, metronidazole and erythromycin are also believed to have minimal risk although erythromycin may induce hepatic cytotoxicity.

Sedatives/anxiolytics – a single exposure to a clinically acceptable dose of a benzodiazepine should have minimal risk for teratogenicity when compared with chronic therapy throughout a pregnancy. Nitrous oxide – minimize prolonged use.

September 1998

Maria Santos

Alexander RE. Eleven myths of dentoalveolar surgery. JADA 1998;129:1271-9.

SUMMARY: Eleven myths involving dentoalveolar surgery are presented that do not have a scientific basis. 1) *People who use aspirin won't stop bleeding after surgery.* The long-term use of aspirin and NSAIDs appear rarely to cause any clinically significant bleeding problems, even in major general surgery cases. There is no evidence in the literature that dental surgery must be delayed to discontinue aspirin therapy. 2) *Patients should use salt-water mouthrinses after surgery.* There is no evidence that intermittent use of salt water has any advantage over plain tap water (depending on the water supply) in immunocompetent patients, and patients have been shown to be incapable of mixing accurate solutions from provided instructions. 3) *Drinking through a straw or sucking will dislodge the blood clot from the alveolus.* No scientific evidence here. 4) *Drinking carbonated beverages will cause dry sockets or other problems.* Again no scientific evidence to prove a relationship here. 5) *Drinking alcohol-containing beverages will cause dry sockets.* Patients should refrain from drinking alcohol due to effects on healing and potential for interactions with medications, not to prevent dry sockets. 6) *Menstruating women who undergo surgery will have significant post-op bleeding.* No evidence. 7) *Patients should never receive bilateral mandibular blocks.* Avoid in children to minimize chewing on the lower lip but administration of local anesthetic should be dictated by the needs of the patient and the planned procedure. 8) *Oral post-op instructions are sufficient.* Not true for most patients. Written instructions are necessary. 9) *Teeth should never be extracted in the presence of active infection.* Removal of the source of the infection usually results in a faster resolution of the infection and rarely causes complications. Patients who are severely infected, are immunologically compromised or suppressed, or have uncontrolled metabolic diseases should begin an appropriate antibiotic regimen and be immediately referred to an experienced surgeon. 10) *Dentists should not perform surgery on a pregnant patient in the first or third trimester.* Elective procedures are performed with the least risk during the middle trimester, but there is no valid reason for deferring treatment or withholding essential, emergency surgery from a patient who has an uncomplicated pregnancy. 11) *Patients should not eat or drink anything after midnight before receiving inhalation or IV sedation.* Prolonged fasting and restriction of fluid intake have been proven to be of no value and of some possible harm in patients about to receive conscious sedation or general anesthetic. Clear fluids only need be restricted for 2-3 hrs and solid foods for 4-5 hrs before administering conscious IV sedation.

C&C: Interesting points brought out here. I wonder if salt water can be considered useful for a placebo effect.

September 1998

John M. Yaccino

Christensen GJ. Pulp capping 1998. JADA 1998;129:1297-9.

SUMMARY: There is not a universally accepted procedure or concept for pulp capping. Most practitioners agree that attempting to cap a profusely bleeding or purulent pulp is futile. If clinical success is expected, bleeding from exposed pulp tissue should be minimal, and it should stop soon after the exposure. Carious pulp exposures are

almost certainly loaded with microorganisms. Patients with large pulp exposures should be warned that when pulp capping is attempted, long-term success is certainly less predictable than when pulp exposures are small or noncarious. Mechanical exposures have a good prognosis if capped adequately. Gambling with pulp capping is probably indicated in situations where inexpensive intracoronal restorations are planned as the final restoration. Endodontic therapy is probably indicated when crowns or fixed partial dentures are planned as final restorations in any case of a carious exposure. Materials that may be used for pulp capping include calcium hydroxide pastes and bonding agents, including 4-META bonding agent (Amalgabond).

CC: Fairly practical and progressive concepts presented. Our historic 90+% success rates make RCT much more predictable than pulp capping in most cases.

September 1998

John M. Yaccino

Fava LRG. Acute apical periodontitis: incidence of post-operative pain using two different root canal dressings. Int J Endo J 1998;31:343-7.

PURPOSE: To compare the incidence of post-op pain in teeth with acute apical periodontitis derived from non-vital pulps that were dressed with either a calcium-hydroxide paste or a combined corticosteroid-antibiotic solution.

M&M: 60 max incisors diagnosed with acute apical periodontitis caused by a non-vital pulp were treated in 2 appointments. Half the teeth were treated with CaOH as an interappointment medication, the other half were treated with a corticosteroid-antibiotic medication (polymyxin B sulphate, neomycin sulphate, and hydrocortisone). Pain was recorded by the pts as none-slight, moderate, or severe after 48 h and at 7 days when RCT was completed.

RESULTS: No significant differences were noted. 2 pts in the CaOH group and 1 pt in the corticosteroid-antibiotic group had moderate pain (relieved by analgesics) after 48 h. No pts reported pain at 7 days.

C&C: No control groups here. Discussion focused mainly on the modern cleaning and shaping techniques employed (crown down, balanced force, patency) using a gentle instrumentation which caused no additional damage to periapical tissues.

September 1998

John M. Yaccino

Bohsali K, Pertot WJ, Hosseini B, Camps J. Sealing ability of super EBA and Dyract as root-end fillings: a study in vitro. Int Endo J 1998;31:338-42.

Purpose: To compare the leakage behavior *in vitro* of Dyract with Super EBA as root-end fillings. Dyract is a compomer or a polyacid-modified resin composite. It contains all the essential components of a GIC but at levels that are insufficient to produce an acid-base reaction in the dark. It undergoes a weak acid-base reaction by the uptake of water.

M&M: 48 extracted single-rooted teeth were prepared and obturated with GP and Pulp Canal Sealer. After storage (1wk), the apical 3-mm of each tooth was sectioned and a 4-mm root-end cavity prepared with a size 1 microbur. 20 teeth were filled with fast-set Super EBA then finished with a 30-blade finishing bur. 20 teeth were filled with Dyract (2 layers of adhesive each left in place for 30s and light-cured for 10s followed

by Dyract which was light-cured for 40s) and finished with the same finishing bur. All teeth were stored at 37°C and 100% humidity. After 27d, half of the teeth were coated and immersed in basic fuschin for 72h. The others were immersed after 87d. The teeth were then embedded and sectioned. Linear leakage was measured under x48 using a stereomicroscope.

Results: At both periods, more leakage was observed with Super EBA than with Dyract. More leakage was observed at the 12-wk period than at the 4-wk period for both materials. No significant difference was noted between the materials at 4-wks; however, at 12-wks, a statistically significant difference was noted.

CC: The results of this study favors the use of Dyract as a root-end filling material. The inconveniences include: the need for a bonding agent, the material may be difficult to control in small cavities, and the material is more sensitive to moisture in its unset state. Its physical and biological properties after contamination with blood are still untested. *Also, small or specialized light-curing tips may be needed.*

October 1998

Maria D. Santos

Huque J, Kota K, Yamaga M, Iwaku M, Hoshino E. Bacterial eradication from root dentin by ultrasonic irrigation with sodium hypochlorite. *Int Endo J* 1998;31:242-50.

Purpose: To evaluate bacteriologically the effectiveness of irrigants on eradication of bacteria from smear layer on canal surfaces and from deeper layers of root canal dentin using controlled experimental models where bacteria were artificially contaminated.

M&M: Several species of bacteria were cultured, harvested, and resuspended to give a final specific concentration. The bactericidal effect of ultrasonic vibration alone was tested in a capillary tube containing *P. acnes*. The bactericidal effect of 6% NaOCl alone was also tested on the same bacteria. Exp. 1: Extracted, single-rooted teeth were decoronated, enlarged to a 40 or 60, then irrigated ultrasonically with 12% NaOCl. Dental plaque from healthy volunteers was collected and mixed with softened dentin; this was rubbed on root canal surfaces to create an artificial smear layer. Some teeth with the artificial smear layer were prepared for SEM evaluation. Others were ultrasonically irrigated with various concentrations of NaOCl (.05% -12%), 15% EDTA, or sterile water. Some chambers were irrigated using a syringe of 12% NaOCl. After washing the canals with 5 ml sterile saline, the roots were split in half and dentin samples taken and cultured. Exp. 2: More teeth were prepared and ultrasonically irrigated to determine bacterial eradication in deeper areas. Reservoir channels parallel to the canal were made with Peeso reamers, ultrasonically cleaned with 12% NaOCl, filled with bacterial suspension, and then sealed with wax. The canals were irrigated and sampled as in Exp. 1.

Results: Ultrasonic agitation of *P. acnes* killed 17.3% of the bacteria while exposure to 6% NaOCl for 20s killed all the cells. SEM revealed open tubules after ultrasonic irrigation with 12% NaOCl; this method was also effective on removal of the artificial smear layer. The artificial smear layer formed uniformly with bacteria dispersed in layers. No bacteria were recovered after ultrasonic irrigation with 12% or 5.5% NaOCl while bacteria were recovered after ultrasonic irrigation with 0.5% NaOCl, 2.5% NaOCl, 15% EDTA, water and syringe irrigation with 12% NaOCl. No *P. acnes* were recovered from the channels after ultrasonic irrigation of the canal with 12% NaOCl nor after syringe irrigation with 12% NaOCl. Less concentrated NaOCl and EDTA

failed although the number of bacteria decreased. Other bacteria were also eliminated in deeper areas with ultrasonic 12% NaOCl. All methods were less effective in deeper areas beneath fins.

CC: "Ultrasonic irrigation with 12% NaOCl appeared to eliminate bacteria efficiently from surface, shallow and deep layers of root dentin." *I wonder if the ultrasonic unit survived, not to mention the operator's eyes and respiratory tract. How about a rebuttal from the Scandinavians?*

October 1998

Maria Santos

Albashaireh ZSM, Alnegrish. Postobturation pain after single- and multiple-visit endodontic therapy. A prospective study. J of Dentistry 1998;3:227-32.

PURPOSE: To investigate the incidence and nature of postobturation pain following the use of single- and multiple-visit RCT.

M&M: 300 teeth were treated by a single operator using step-back technique with 2.5% NaOCl and lateral obturation with GP and Sealapex; half in single-visit and half in multiple-visits. No pts were experiencing pain when first seen. Teeth with extensive intracanal calcifications, incompletely formed apices, or teeth tender to touch were excluded. Pain levels (none, slight, moderate, severe) were recorded by pts at 1, 2, 3, 7, and 30 days after obturation.

RESULTS: Of the 291 pts followed, 142 had single and 149 multiple-visit treatment. The incidence of pain was greatest during the first 24 h and quickly decreased thereafter. Nearly 97% were pain free 7 days after treatment. 38% of the pts in the multiple-visit group experienced pain during the first 24 h compared to 27% in the single-visit group (significant). A significant association was seen between postobturation pain and nonvital pulps (41% postop pain vs 9% in vital cases). No significant correlations were demonstrated between postobturation pain and tooth type, preop pain, and sex or age of the patient.

C&C: Single-visit looks good here. Other studies have grouped slight pain with none; this wasn't done here. Authors didn't say how many nonvital pulps were treated in each group. It would have been nice not to exclude pts in pain and teeth tender to touch since a lot of patients fall in these categories. 9 pts were excluded from the study. 8 were from the single visit group. 3 required surgery 2 wks after treatment and 1 had the tooth extracted. These might have changed the statistical significance somewhat.

November 1998

John M. Yaccino

Trope M. Subattachment inflammatory root resorption: treatment strategies. Pract Periodont Aesthet Dent 1998;10(8):1005-1010.

Summary: In order for root resorption to occur, two conditions must be present: 1) a change in the protective attachment layer (predentin internally and precementum externally) of the root, and 2) an inflammatory process adjacent to the damaged root surface.

A traumatic injury results in an unprotected or altered root surface that, in the presence of an inflammatory response, attracts resorbing cells. It is presently

accepted that the stimulus for the subepithelial inflammation is sulcular infection. The pulp is generally normal but the defect may impinge on the predentin often resulting in pulp exposure. RCT may be necessary and should be considered prophylactically if the resorption is extensive.

- Localized defects in the coronal third of the tooth - A full-thickness flap is reflected and the granulomatous tissue removed to prevent revascularization of the resorbed tissues. The defect is filled with a restorative material and the flap replaced.
- Localized defects in the coronal and midroot dentin - A flap is reflected and the granulomatous tissue is removed from the bony defect. An acid-etch adhesive technique is used to fill the defect and a nonresorbable e-PTFE membrane may be used if bone loss considerable and unaffected root is present coronal to the resorptive opening. After 1 month, the tooth is opened and the necrotic granulomatous tissue is removed; the need for RCT is evaluated. Another approach is to orthodontically extrude the tooth, perform the needed repair, and then intrude the tooth to its original position.
- Major defects extending apically - options: forced eruption or removal of granulomatous lesion followed by GTR.

Prevention:

- Nonvital bleaching - protect cervical tubules by placing a protective base, avoid use of heat and etching of dentin, avoid use of bleaching agents that may be caustic (superoxol)
- Orthodontic therapy - minimize forces
- Surgical procedures - avoid excess use of surgical elevators or procedures that damage the cervical margin.
- Periodontal - minimize procedures that denude roots

November 1998

Maria Santos

Holland R, Otoboni FJA, Bernabé PFE, Souza V, Nery MJ, Dezan E. Effect of root canal filling material and level of surgical injury on periodontal healing. *Endodontically Dent Traumatol* 1998;14:199-205.

PURPOSE: To observe whether the type of root canal filling material and the location of the experimental periodontal lesion, reaching the canal space, influence wound healing.

M&M: 24 roots in 2 dogs were instrumented and obturated using gutta-percha and either a ZOE or a CaOH sealer (Sealapex). Some time later, the bone tissue was exposed and two cavities were made through bone, cementum, and dentin, reaching into the root canal filling material with a #6 round bur. One cavity was prepared at the apical third of the root and the other at the border between the middle and coronal thirds of the root. The dogs were killed after 6 months and the newly formed cementum, PDL, inflammatory reaction and the presence of debris from the root canal in periodontal tissue was examined.

RESULTS: Significantly better results were seen in the wounds made in the apical third of the roots than those made at the middle-coronal border. Better results were noted with the CaOH sealer than with the ZOE cement. 15 specimens were observed with complete or incomplete closure when the CaOH sealer was used, whereas only 6 specimens were seen with the ZOE sealer.

C&C: I might have missed something here, but I'm not sure where the clinical significance is here.

November 1998

John M. Yaccino

Doyle DL, Dumsha TC, Sydiskis RJ. Effect of soaking in Hank's balanced salt solution or milk on PDL cell viability of dry stored human teeth. Endodontically Dent Traumatol 1998;14:221-4.

PURPOSE: To evaluate the effect of pre-soaking of avulsed teeth in either HBSS or milk for 15 minutes on PDL cell viability at extraoral dry times of 30, 60, and 90 minutes.

M&M: 49 freshly extracted human teeth (molars, premolars, anterior teeth - all free of periodontal disease) were divided into none experimental groups of five teeth each. The teeth were stored dry for 30, 60, or 90 min and were either not rehydrated or soaked for 15 min in milk or HBSS. 2 teeth were used as positive (0 min dry) and negative (2 hr dry) controls. PDL cells were collected and the viable and non-viable cells were counted.

RESULTS: The number of viable cells were converted into percentages and the mean values were calculated. 0 min - 51%, 2 hr - 2%, 30 min - 25%, 30 min/milk - 21%, 30 min/HBSS - 30%, 60 min - 21%, 60 min/milk - 16%, 60 min/HBSS - 25%, 90 min - 7%, 90 min/milk - 14%, and 90 min/HBSS - 9%. Results demonstrated no significant difference in the number of viable cells with or without soaking in HBSS or milk at any of the dry storage times. In addition, there was no significant difference in PDL cell viability between the 30 and 60 min dry periods.

C&C: What will Krasner say.

November 1998

John M. Yaccino

Robertson A, Andreasen FM, Bergenholtz G, Andreasen JO, Munksgaard. Pulp reactions to restoration of experimentally induced crown fractures. J Dent 1998;26:409-16.

Purpose: To observe the condition of the pulp after experimentally induced crown fracture and restoration of the fractured dentin surface.

M&M: Permanent maxillary and mandibular central incisors and canines in monkeys were used. All had open apices. Horizontal crown fractures without exposing the pulp and without luxating the teeth were made via a groove and forceps. The teeth were restored either with a conventional composite with a Dycal base or by reattachment of the tooth fragment using a resin bonding system (Gluma or New Gluma). The animals were sacrificed 3 months later and the teeth examined histologically.

Results: Teeth with a fracture plane that was within 2 mm of the pulp were compared. 33 of 41 had a normal pulp. No significant difference in the frequency of inflammatory infiltrates could be determined between the experimental groups. 80% of the teeth formed reparative dentin. Bacteria were observed in the tubules or at the restored dentin surface in 26 of 41 teeth. Hard tissue repair correlated significantly with the presence of bacteria. Pulp were in good health even teeth in which the restoration or the attached fragment had been lost. Nonfractured controls displayed no or little reparative dentin.

CC: Crown fracture without pulp exposure leads to reparative dentin deposition. Bacteria were unable to sustain adverse influences on the underlying pulp. This is attributed to the presence of PMNs in the tubules during the acute phase of the inflammatory response and also by the increased outward flow of dentinal fluid as a consequence of the inflammatory pulpal lesion. The extent of pulpal repair should be greater in response to a bacterial challenge than if the restoration succeeds to exclude bacterial leakage. The treatment modes did not hinder continued function of the pulp. *Would have been better if there were controls of fractured, unrestored teeth.*

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Maria Santos

Brown AR, Papasian CJ, Shultz P, Theisen FC, Shultz RE. Bacteremia and intraoral suture removal: Can an antimicrobial rinse help? JADA 1998;129:1455-61.

PURPOSE: To determine whether a relationship exists between the incidence of bacteremia and suture removal, especially in patients who experienced bleeding at the surgical site and to determine whether a Peridex rinse could reduce or eliminate the bacteremia.

M&M: 55 pts had 3rd molars extracted and flaps were sutured with black silk. No preop rinses or medicaments in the sockets were used. Warm salt water rinses were allowed postoperatively. Sutures were removed 1 wk later. Half the pts used a Peridex preprocedural rinse. Blood was drawn before and after suture removal to determine bacteremias. Any bleeding during suture removal was recorded.

RESULTS: Bacteremia was found in 6/55 pts; 4 in the Peridex group and 2 in the control group. Bleeding on suture removal occurred in 47/55 pts. None of the pts in which bleeding did not occur developed bacteremia. Therefore, bacteremia developed in 6/47 pts where bleeding occurred (12.8%)

C&C: Peridex did not help reduce the occurrence of bacteremia during suture removal. SBE prophylaxis may be warranted in high risk patients.

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